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The Farmer's Digest

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The Farmer's Digest

Volume 15 April, 1952 Number 10

New Remedy for Breeding Troubles

Condensed from the Farm Journal

Ray Dankenbring

A NEW hormone—ECP—may put into production most of the dairy and beef cattle, sows, ewes, mares, and small animals that won't breed.

ECP has been tested for more than two years at 25 colleges, and by veterinarians in every section of the country, with mostly good results.

Its big use is to bring animals into heat that won't come in normally, and in that respect most research men agree that it's more potent and uniform in action than any other hormone developed or tried so far.

The Upjohn Company of Kalamazoo, Mich., manufactures ECP, and made it available to veterinarians on March 1.

On cattle, it is injected into the neck muscle of cows that fail to come in heat. In two or three days, usually, they come around.

At Alabama Polytechnic Institute, Dr. W. J. Gibbons treated 150 such dairy cows from several herds. Nearly 94% came into heat after one injection, and all the rest after a second injection.

Upon breeding, 38% settled by the first service, and a total of 85% after two services. Even more settled after a third breeding.

That's about as good a result as when you breed cows that come into heat normally.

Another thing happened: the cows that still didn't settle kept coming back into heat; the hormone started and kept them on a normal heat cycle.

At Michigan State College, Dr. George Moore tried the hormone on about 100 cows with breeding troubles, including mummified fetuses and pyometra (pus in the uterus). After one injection, the cows expelled the fetuses, and 3 out of 4 cows suffering from pyometra cleared up so that they

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Philadelphia, Penna., February, 1952

could be bred.

Cows seldom settled on the first service, usually on the second or third.

"ECP is a big improvement over stilbestrol," Dr. Moore says. "So far we've had no harmful side effects." Michigan recommends use of ECP after surgery of the uterus (as in caesareans), and after removal of the retained afterbirth to clean the cow completely.

It works on beef cattle, too. Of course shy-breeding range cattle will be harder to treat, since they can't be noticed or handled as easily. But a vet should be able to examine and treat farm herds without much trouble.

Sheep respond well. In Tennessee Dr. R. J. Williams, a veterinarian, tried ECP to bring ewes into heat during the summer months—their out-of-season period.

In one experiment he injected 48 head, including lambs under a year, ewes with lambs at side, yearlings, and aged ewes.

All came into heat, and 35 settled after the first service. The rest settled on the second, third, or fourth breeding. After just one injection they kept coming back into heat on normal schedule. And every ewe had a lamb!

Since the new hormone will bring ewes into heat at any season of the year, you may be able to use it to produce two lamb crops a year. More likely you will use it to breed them just a little earlier than usual, to beat the market by a month or two.

Even in the South, ewes have been brought into heat at off-seasons. At Alabama Polytechnic Institute 92.6% of 202 ewes were brought into heat and bred in June and early July.

If you plan to breed ewes out of season, you'll need to give the ram an injection of testosterone (the male hormone), because he isn't normally active except during the regular breeding season.

The use of hormones for getting two lamb crops a year isn't new. But ECP is better than any other hormone used previously, because it is more uniform and more potent.

With hogs not much testing has been done, but there's been enough to suggest that a big percentage of the 3 million sows and gilts that fail to breed every year can be helped by ECP.

Horses, dogs, fur-bearing animals all have responded to ECP at California State Polytechnic College (in work by Dr. Gordon C. Stocking) and elsewhere. Stocking even tried ECP on an 11-year-old greyhound that hadn't shown heat for two years. She produced pups!

Not all sterility can be corrected by the new hormone, Dr. J. L. Davidson of the Upjohn Company points out. In dairy cattle, for example, about a third of it comes

from infections, diseases like brucellosis, and anatomical defects.

It's the other two-thirds that ECP can help—animals that just don't come in heat. Of these, Dr. Davidson says that ECP will clear up about 90%.

The Upjohn people plan to sell ECP only to veterinarians, because they believe that all animals should be examined and diagnosed before treatment. An animal might be diseased, for example. That's why you shouldn't inject the new hormone at random. Besides, the size of the dose depends on what's wrong, and it is possible to overdose.

How much will ECP cost?

We can't say for sure, right now, but probably less than most hormones now on the market. Adding the veterinarians' fees to the cost of the hormone makes it difficult to put a price on each treatment, but Upjohn says that it will be reasonable, and well within the reach of farmers.

Better Hog Production

Condensed from the Hog Breeder

W. L. Robison
Ohio Agricultural Experiment Station

A NUMBER of things can be done to step up hog production. One of these is to provide brood sows with fully adequate rations during the gestation period. Corn is satisfactory for making up a relatively large share of the ration of pregnant sows. But, like other grains, it needs to be supplemented with protein, minerals and vitamins.

To keep the feeding program simplified, the same protein concentrate that is fed the growing and fattening pigs can be fed the brood sows. This may be either commercial or home-mixed. But, for sows, some ground oats and some additional ground alfalfa should be mixed with it. With a 34 percent or higher protein concentate, the mixture may be in the ratio of 75 pounds ground oats, 100 pounds of concentrate and 75 pounds of ground alfalfa. Higher proportions of oats and alfalfa would not be objectionable providing enough of the mixture is fed to keep up the protein content of the ration. If oats are not available, bran may be used.

Feeds of this kind are relatively bulky and bulkiness is desirable in the case of dry sows. If it is green, leafy, and of high quality, alfalfa will supply desirable protein, min-

Reprinted by permission from the Hog Breeder
Chicago, Illinois, February, 1952

erals, and vitamins as well as increase the bulkiness of the ration. Either sun-cured or dehydrated alfalfa may be used.

If a 36 percent or higher concentrate is used in the mixture, gilts will need around 0.7 and sows around 0.6 pound of the mixture daily, in two feeds, for each 100 pounds of their live weight. In addition, they should have sufficient ear corn to keep or put them in good condition. If a 34 to 36 percent protein concentrate is used and if the corn is shelled and ground and a complete ration made up, it may contain 40 pounds of the mixture and 60 pounds of corn. A 40 percent protein concentrate would change the proportions to 32 of the mixture and 68 of corn. Ground ear corn is satisfactory for pregnant sows. If it is used, 20 percent should be added to the weights of corn given to allow for the cob.

The use of heat, bulbs or electric hovers, will be helpful in preventing losses of pigs from chilling after they are farrowed. These heating devices also keep the pigs, except while nursing, in a location where they are protected and are not so likely to be laid or stepped on by the mother.

Giving them iron to prevent anemia is another means of reducing losses among suckling pigs. Pigs which have been given iron probably are less susceptible to other troubles than are those which have been weakened by anemia. Iron is particularly important in the case of early pigs and those not having access to soil and green material.

There are a number of ways of giving iron. In our experiences, one of the best is to place a pinch of dry powdered ferrous sulfate, about the size of the tip of the little finger to half the length of the nail, on the pig's tongue. We use a small paddle, such as a mustard paddle. This should be done when the litter is four to seven days old and thence once a week until the pigs are eating or have access to soil or green feed. Reduced iron is better than ferrous sulfate since it is bland instead of astringent.

After the pigs are farrowed, the sows should receive less bulk and more protein in their ration. If they are on pasture, they will need no dry alfalfa, other than that commonly included in the protein concentrate. This usually will not be in excess of four or five percent of the total ration. During the first 24 hours after farrowing, sows should have all the water they care for but little or no feed. The amount of feed can be stepped up gradually. By the time the pigs are around 10 days of age the sows will be receiving practically all the feed they will clean up twice daily.

Getting the newly-farrowed pigs off to a good start is impor-

tant. An old saying which has a great deal of truth in it is that "a pig well started is half raised." One way of doing this is to begin feeding them in a creep, from which the sows are excluded, as soon as they will eat. A visitor from England last summer told of one section there where baby pigs were taught to eat by placing feed on the floor of their pen when they were only a few days old. He reported that pigs handled in this way were of above average weight at eight weeks of age or at weaning time.

A liberal amount of protein in the ration is desirable for young pigs. We commonly feed them a ration containing approximately 18.5 percent of protein. Some authorities recommend as much as 20 to 21 percent of protein in rations for suckling pigs.

Experiments have shown that feeds such as fish meal, milk products, and meat scraps or tankage supply some nutrient not supplied by plant protein concentrates. Fortunately, research has revealed what was lacking, and highly effective rations containing no animal protein concentrates can now be provided.

Like the grains, plant protein concentrates are low in minerals. Hence, added minerals are particularly essential when high-protein feeds, such as soybean oil meal, are used. Common salt, calcium and phosphorus are minerals that are needed in the largest amounts. Calcium and phosphorous can be supplied at a relatively low cost through pulverized limestone and feeding bone meal or defluorinated rock phosphate.

Although more information is needed and they may not always prove beneficial, minute quantities of certain trace minerals are considered desirable as a precaution against deficiencies. This is true, particularly, when plant protein concentrates are fed. Among those commonly used are iodine, manganese, cobalt, copper and zinc. These can be supplied through the use of trace mineralized salt. A possible mineral mixture is one of trace mineralized salt, 19.2; limestone, 38.4; bone meal or defluorinated rock phosphate, 38.4; ferrous sulfate, four.

Some minerals are not particularly palatable to pigs. Therefore, including the minerals in the supplement and thus forcing the pigs to take given quantities is considered advisable. If there is a question of the adequacy of the minerals in the supplement, the pigs may be given free access to additional minerals. In addition to the high protein feed and the minerals, the supplemental mixture should also contain 20 to 25 per cent of alfalfa or enough to insure from four to five per cent in the total ration.

Corn, soybean oil meal, alfalfa, and mineral ration and probably others are below the proper level, especially for young, growing pigs in a number of B complex or water soluble vitamins. These include riboflavin, calcium, pantothenate, niacin, and choline chloride. Additional quantities of these may be supplied through the use of feeds such as condensed fish solubles, dried brewers' yeast, and dried distillers' grain solubles. These are rich in water soluble vitamins. Or, mixtures of synthetic water soluble vitamins may be added. At least two manufacturers have products of this kind on the market. Suggested levels of feeding condensed fish solubles, dried brewers' yeast, and dried distillers' grain solubles are at the rate of three percent, two percent, and five percent of the total ration, respectively. Roughly, three to four times these quantities would be needed in a supplemental mixture.

Further improvements in a soybean oil meal ration are brought about by vitamin B_{12} and antibiotic supplements. Vitamin B_{12} was formerly referred to as the animal protein factor. Although dried brewers' yeast and dried distillers' grain solubles are rich in some of the other water soluble vitamins, they are low in vitamin B_{12}. A number of vitamin B_{12} and antibiotic supplements are available to the feed trade. Rations of corn, soybean oil meal, alfalfa and minerals to which a mixture of synthetic B vitamins or a natural source of B vitamins and a vitamin B_{12} and antibiotic supplement were added have given excellent results when fed to pigs in dry lot.

The evidence is not conclusive but there is some indication that the use of antibiotics may be beneficial in helping to control some of the enteric diseases with which pigs are troubled.

If the effect of size of parent stock on the gaining ability of the offspring is taken into account, a rotation system of crossbreeding for the production of market hogs would be expected to step up the percentage of pigs surviving to a marketable weight. It would also be expected to increase the average weight per litter at a given age. In tests at the Miami County Experiment Farm, three-breed rotation crossbred and comparable purebred litters from sows averaged 10.0 and 10.3 pigs at birth. At six months of age the crossbred and purebred litters averaged 7.8 and 6.6 and weighed 1782 and 1450 pounds, respectively.

Developments in Turkey Nutrition

Condensed from the Rural New Yorker

E. I. Robertson

TURKEY broilers are the latest boost to the industry. Some growers who formerly raised only chicken broilers have been attracted by the improved market appearance of young turkeys. The term, turkey broilers, has provided additional publicity in introducing turkeys to new consumers. Among established producers, greater attention is therefore now being focused on early feeding of poults to reduce mortality and to get them off to a good start. New research findings show that in turkeys, as in other species, many of the ills of the young are preventable through improved nutrition of the mother.

The investment in a hatchable turkey egg is considerable. It incorporates the latest advances in breeding for improved market type and efficiency of feed conversion. The health and survival of the future poult have been partially assured by blood testing the breeders. Considerable management planning is required to provide hatchable eggs at a particular season. For top hatchability, the breeding flock must be on a high plane of nutrition. Only by hatching a strong vigorous poult can the overhead expense of selecting and maintaining a breeding flock and the operation of a hatchery be met.

The best start in life for the poult is provided when the breeding hen is well fed and well nourished so that she can deposit all essential nutrients in the egg before it is laid. The egg must include all the nutrients needed to feed the embryo for 28 days during embryonic development, and should provide a surplus for carry-over to the poult at hatching time. Nourishing the young through the mother has the added advantage of providing essential nutrients during the most critical period in the development of the young.

In the process of hatching, about two days before the poult emerges, the unused portion of the yolk sac enters the body as a reserve, or carry-over, of nutrients to the young poult which now is ready to begin life outside the shell. Poults that have a low re-

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serve or carry-over often fail to hatch, or may die soon afterwards, or become so stunted as never to become profitable turkeys. On the other hand, a large carry-over of nutrients assures a good start in life and may prevent starve-outs and other troubles that beset the young poult.

The importance of using a high quality breeder ration cannot be overemphasized. Usually a turkey breeding flock is maintained only for a few months. Consequently, the cost of wintering and maintaining the breeding flock must be borne by the poults hatched from relatively few eggs, usually less than 75 eggs per hen. The short period of intense egg production usually causes the breeders to lose bodyweight, so that their salvage value in the Spring is less than the previous Fall. This loss in carcass value must also be borne by the poults.

The feeding habits of adult turkeys cause them to consume more grain than mash, if both are fed free choice. Since the mash must supply an excess of nutrients to balance the deficiencies in the grain, quality in the breeder mash assumes added importance. Feeding of pellets, as part or all of the mash, permits breeders to consume sufficient nutrients to provide adequate carry-over to the poults.

The relative slowness of young poults to start eating further emphasizes the value of a high carry-over of nutrients from the egg. Differing from day-old chicks that start feeding immediately after removal from the boxes, young turkeys may require special attention to train them to eat. This is especially true if the brooder temperature is low, or if the lighting is poor. Shiny marbles will catch the poult's eye and start it pecking at the feed; also chick grain, grated hard-boiled eggs, and rolled oats have been used successfully by many growers in getting poults off to a good start.

In the process of changing from life in the shell to life outside, from a cold-blooded creature to a warmblooded one, the poult may not be able to use nutrients in the starting feed as well as when these nutrients are deposited in the egg. For example, research by the writer has shown that poults, from breeders receiving adequate vitamin D, lived and grew to two weeks of age, more in relation to the level of vitamin D supplied the breeders than to the amount of vitamin D in their starting feed. However, after two weeks of age, growth and calcification in the poult were determined more by the starting ration than by the breeder mash.

More recently, workers from Iowa have reported that five successive hatches of Beltsville White poults, from breeders fed a ration low in vitamin B-12, showed a

progressive decline in poult weights at four weeks of age, indicating nutritional depletion of the breeders. Adding vitamin B-12 to the poult ration was only partially effective in overcoming this decline.

These examples clearly demonstate the value of getting the poult off to the best start in life by feeding a top quality ration to the breeding flock, so that a surplus of nutrients will spill over into the egg to provide a large carry-over of nutrients to the newly hatched poult.

The fast growth rate of young turkeys emphasizes the importance of a nutritionally balanced ration during this critical period of development. Most growers now recognize the value of feeding a manufactured turkey starter for eight to 10 weeks in order to obtain the benefits of latest nutritional discoveries, even though the flock may be finished largely on locally produced grain. Thus the findings of research are provided in the feed that is used during the most critical period of growth.

Turkeys require higher levels of protein, vitamin A, vitamin D, riboflavin, calcium and phosphorus than do chicks. The National Research Council recommends 28 per cent protein for turkey starter rations, but the use of antibiotics in the feed may lower this requirement. High levels of other nutrients return good dividends in increased growth. Increasing the available energy in a turkey starter, by replacing 20 per cent mill feeds with ground corn, increased gains by a half pound at eight weeks of age. Neither poults nor chicks can digest fiber and, because of their limited digestive tract, are handicapped by high fiber rations.

The growth rate of poults, chicks and ducklings is related to their rate of thyroxine secretion. According to recent reports by Massachusetts workers, young crossbred turkeys had higher rates of thyroxine secretion than did the pure offspring of the parent varieties. This evidence is interpreted as one basis for hybrid vigor which is achieved by crossing varieties and breeds.

Poults exhibit a more dramatic response to antibiotics than do chicks, according to recent experimental reports. While chicks may show a 10 to 15 per cent increase in growth, turkeys may gain 20 to 30 per cent faster when an effective antibiotic is included in the ration. Penicillin, aureomycin, terramycin and bacitracin appear equally effective at levels of four to five grams per ton of feed; but at lower levels, penicillin gave the greatest response.

The benefit of antibiotic supplementation is presumably due to their effect on the microorganisms in the digestive tract. Antibiotics have practically eliminated the

severe inflammation of the vent in young turkeys. Growth stimulation from antibiotics is greatest during the early weeks of life, and diminishes as the turkeys grow older with mature size not being affected. Both toms and hens were equally benefited by aureomycin feeding. Vitamin B-12 has produced no response comparable to antibiotics, yet growth stimulation in poults has been greater when the ration contained fish meal (Vitamin B-12) than when composed entirely of vegetable sources. This may, however, be due to some other factor as yet undetermined.

Poults respond favorably to feed in crumble form during the starting period. Crumbles have produced one-quarter pound heavier poults at eight weeks of age than did mash. However, crumble fed birds exhibit a greater tendency to feather picking during the growing period if reared on platforms. Some growers who start poults on crumbles shift back to mash at five or six weeks of age for platform reared turkeys, or use pellets for range feeding.

The hock problem continues to plague turkey growers and nutritionists, but some light is being shed on the trouble by recent research reports. Typically, the problem is encountered only in toms of the broad-breasted variety, and is worse with platform rearing than when turkeys are ranged. Though the disorder shows up when the toms are 12 to 16 weeks of age, evidence is rather clearcut that the malady began earlier and was aggravated by the increasing weight of the turkey.

A solution to the hock problem has been the research target of Dr. M. L. Scott at Cornell University. His studies have shown that the hock disorder is caused by a deficiency of an unidentified factor present in appreciable quantities in dried brewers' yeast. Under certain conditions, the intestinal microorganisms in the turkey are capable of producing this required factor. However, the inclusion of more than usual amounts of feeding oil, or the absence of fish meal or meat scrap, aggravate the incidence of the disorder, apparently through inhibition of intestinal synthesis of the unknown factor.

The inclusion of antibiotics reduced the severity of the hock disorder in all rations. Likewise, the inclusion of dried brewers' yeast in the starting ration has been successful in reducing this trouble.

Oats may be fed up to 50 per cent of the total ration for growing turkeys without retarding their growth rate, according to a recent report from South Dakota. Calculation showed this ration to contain about 8 per cent fiber, and the efficiency of feed conversion was slightly lower on this level of fiber even though growth was not

affected.

Enheptin (amino nitrothiazole) in turkey growing pellets continues to be the most effective control for blackhead in turkeys. This drug is the only one available with experimental evidence to justify its use in the prevention and control of this disease. Because of the cost of the drug, most growers rely on therapeutics rather than preventive medication.

When You Buy Credit

Condensed from American Agriculturist

L. J. Trunko

It was only a few years ago that Dad traded in the big white team of horses for a new two-plow tractor. The two horses cost him $300, the tractor, $2,000. This, plus the tractor-drawn equipment and other modern improvements, gave us a total investment in machinery and equipment of about $5,000. It takes a lot of money today to keep a farm up-to-date, and most of the money used in purchasing it has to be borrowed. A tractor and baler alone may cost $6,000.

There isn't much the farmer can do to reduce the cost of his equipment, but there is something he can do to reduce the price of the money he has to borrow. This "price tag" on money is what we call interest.

The interest rate is made up of three things: 1. cost of the funds; 2. risk of loss; 3. costs of making and servicing loans. The use cost of funds is what the investor gets for the use of his money. The risk factor varies according to the hazards of the area and the amount of security offered. The cost of making and servicing loans varies with the size of the loan and the repayment terms. The "price tag" is usually higher on small short-term installment loans and smaller on the long-term well secured loans.

The important thing for the farmer to look for in a loan is the way the interest is figured and the total cost to him. A loan of $1,200 for six months may have a price tag of from $21 to $72 as shown

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Ithaca, New York, February 2, 1952

in the following table:

	Plan 1 Annual Interest On Outstanding Balance	Plan 2 Annual Interest on Original Amount	Plan 3 Fixed Percentage of Original Amount
Original Loan	$1,200	$1,200	$1,200
Interest			
January	$6.00	$6.00	$12.00
February	5.00	6.00	12.00
March	4.00	6.00	12.00
April	3.00	6.00	12.00
May	2.00	6.00	12.00
June	1.00	6.00	12.00
Total Interest	$21.00	$36.00	$72.00
Payment as Percentage of Original Loan	1.75%	3.00%	6.00%
Interest Rate on Annual Basis	6.00%	10.30%	20.60%

The table shows three methods of figuring the interest on a $1,200, 6% 6-month loan with payments on the principal of $200 each month. In Plan No. 1, the interest is figured on the outstanding balance only; that is, you pay interest on $1,200 for January; $1,000 for February; $800 for March, and so on.

In Plan 2, the interest is computed on an annual basis but with no deduction for principal payments. Therefore, the interest for 6 months on $1,200 at 6% is $36. In Plan 3, a flat fixed percentage is charged on the original amount of $1,200—a flat rate of 6% of $1,200, or $72, regardless of the length of the loan repayment period. This latter method is most commonly used in personal loans and store purchase loans.

There is a wide variation in the cost of using money, and a close examination of the "price tag" may mean a considerable saving each year to many farmers.

Interior Quality Inherited

Studies on interior egg quality are numerous, but it is only recently that breeders have become aware of the fact that many of these characters are to some extent determined by heredity. For example, the breeder may, if he so desires, select for any or all of the following characters: (1) freedom from blood spots; (2) freedom from meat spots; (3) freedom from fishy flavor and odor; (4) freedom from blemished yolk; (5) high percentage of thick white; (6) high riboflavin content; and (7) high thiamine content.

—American Poultry Journal

You'd Never Know the Old Place

Condensed from Nation's Business

Hodding Carter

THE PARISHIONERS of St. James Episcopal Church of Greenville, Miss., were startled one Communion Sunday last fall by the footgear of a kneeling male communicant. The stranger at the altar rail wore shoes that were pointed and extended far inside the trouser cuffs, and were supported by three-inch heels. Unmistakably, the otherwise acceptably dressed worshiper was wearing cowboy boots. Probably a Texas visitor, they surmised, or even the star performer of a wild west show.

But the wearer of the unorthodox boots was neither. He was, instead, a bona fide Texas rancher who had migrated with five cow ponies, two ranch hands, 400 head of cattle, a roundup dog and an attractive family to the greener pastures of the new cattle country in the lower Mississippi valley.

Though his boots were a little surprising, the people of the Mississippi Delta—that flat, alluvial land running south from Memphis to Vicksburg and lying between the Mississippi and Yazoo rivers—were not otherwise astounded by his arrival. For more than five years, cotton's ancient kingdom, from Georgia to the banks of the Mississippi, has been growing as accustomed to the roundup and the stockyard auction as to the lint that clings all fall to the suits of the planter and the cotton classers.

This land, once prostrate from a one-crop cotton economy, also has been meeting other newcomers set apart less by their garb than by their occupations. Among the new citizens of the little river city in cotton's old kingdom could be counted several south Louisiana Cajuns, drawn to the Delta because they were expert at rice growing, and rice was becoming a major crop on the black, clayey "buckshot" along the river.

Their fellow newcomers to the Delta included Scandinavian-American dairymen from Wisconsin, attracted by the prospect of year around grazing and mild winters; an Iowan who knew about the management of grain elevators; a brisk Missourian who superintended the gigantic, newly constructed soy bean elevator and

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processing plant; an Arkansas hillman who had gone into large-scale chicken processing, and two young New York brothers on whose newly acquired plantation grazed 600 head of sheep.

All of them, cowboys and Cajuns, Swedes and hillbillies and upstate New Yorkers, are human evidence of an amazing shift in agricultural operations. The changes are most pronounced in the South but they are taking place elsewhere in the nation as well; if the outsider is coming into the old cotton South to diversify and enrich its agriculture, and if most of the long-time citizenry are beginning to do the same thing, other southerners are following cotton on a long journey west.

Out in the Southwest and on the West Coast, men who once talked only of livestock or orchards or large truck farming enterprises are shifting cotton's center to their irrigated lands. Corn to North Carolina, wheat to the East, cattle and corn and oats to the deep South, cotton to the West—not by happenstance or, at the other extreme, through government order, but as the end result of a variety of agricultural programming.

It is difficult to determine the primary credit for this potentially most enriching and salutary development in the history of American agriculture. Certainly the original farm program back in the early 1930's, withdrawing lands from production of row crops, and putting a premium on soil conservation and new crops and healthy agricultural practices, hastened the day.

Equally certain, the new breed of farmers, developed in the agricultural colleges of the country, are more receptive to experimental change. The dictates of relative yields per acre, especially in a day of rising production costs on all fronts, make it imperative that the farmer turn from one staple to another or from staple to specialties in terms of what pays him best.

The demands of a wartime economy are significant too, as witness the upsurge in cotton planting—reversing the new trend in the deep South with not altogether fortunate results—because of the Government's demand for 16,000,000 bales in 1951.

The state extension services, the agricultural experimental stations, and the patient, sweating, dedicated county agents are all heartening examples of federal-state cooperation with the individual on a voluntary basis. They prove and prompt and persuade, and the farmer listens and generally follows suit, because he has learned that these educators talk sense.

Only a quarter of a century ago, probably a majority of southern

farmers laughed at the agricultural scientists, the men who thought book learning had something to do with farming. Now, the agricultural experiment stations are visited by the multiplied thousands of believing farmers; the friendly agent is listened to, and the bulletins of the extension services are read and put into practice. And the soil mappers have made the farmer think twice before he decides what to do with that hundred-acre tract.

This kind of government participation in farming practice is voluntary, or largely so, and it is likely to remain that way. As a reporter who has been covering the Department of Agriculture in Washington for many years explains:

"With planting patterns as they are at present, our farm output has about reached its limit. The best promise for any sizable increase is a more efficient use of the land, such as growing cotton in areas that produce the most per acre, and transferring the displaced crops to other sections which can produce them in equal measure. Thus cotton planting is increased in California and decreased in Georgia while beef, dairy or vegetable production is decreased in California and encouraged in Georgia. Another goal is economy in transportation. In World Wars I and II our most acute shortages often were not the result of an over-all scarcity in those commodities but rather the inability to transport them to the consumer."

Already the farmer has been conditioned to such a voluntary program, if it should be adopted, by the work of several agencies: the Soil Conservation Service, the Extension Service, the Production and Marketing Administration, the Forest Service and the Rural Electrification Administration. They have been preaching selective agricultural production since the 1930's, and especially since World War II, at the level of the individual farmer.

So it is that historical patterns are being overturned, and that the transition will be hastened by education and by defense needs.

As a case in point, take the production of cotton in Alabama and Georgia. Georgia's ten-year average was 243 pounds to the acre, and Alabama's 272 pounds. On the other hand, two newcomers to cotton production, California and Arizona respectively, produced in 1950, 770 pounds and 634 pounds to the acre. Last year's total production in Georgia was only 510,000 bales and for Alabama 580,000 while California produced 880,000 bales and Arizona 428,000 as against a ten-year average of 188,000. It's easy to see in what direction cotton is heading.

But before feeling sorry for Ala-

bama and Georgia, take a look at what is happening to livestock. Especially in the past five years, cattle raising has been encouraged, and new types of grasses, legumes and other forage crops developed for the once worn-out cotton lands. Today, western cattlemen, accustomed to a ratio of ten acres to one head of cattle, gape at a deep South production record of 1,200 pounds to the acre on once abandoned land.

In 1950 Georgia's and Alabama's and Mississippi's cattle increased more than 11 per cent, while the nation showed only a three per cent rise—and California and Arizona actually declined one per cent!

An even more emphatic demonstration of change appears in a comparison between the number of cattle in the legendary cattle raising West, and in the south Atlantic states: 13,345,000 in the West, and 20,035,000 in the south Atlantic. And while the South showed an over-all increase of about seven per cent, the West showed a decline of two per cent.

The same trend is apparent in dairying. The number of dairy cattle in the north central states, including Wisconsin, decreased one per cent in 1950 over 1949, while the number increased four per cent in the south Atlantic and the south central states in the same year.

Nor are these revolutionary switches restricted to cotton and cattle. Thanks to new hybrids and anhydrous ammonia applications, the South is now producing, on once exhausted lands, corn yields as great as or greater than those on the much higher priced lands of the corn belt. A North Carolina experiment has shown that it cost only 71 cents a bushel to produce 81 bushels of corn per acre in contrast to $1.24 a bushel on land producing only 28 bushels.

This development and cultivation of plants resistant to or adaptable to climatic peculiarities has other startling aspects. Dr. Robert M. Salter, chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering at the Agricultural Research Center, Beltsville, Md., predicts that the cost of growing wheat in huge yields per acre on irrigated eastern coastal land will some day be considerably less than for smaller yields on the southwestern plains.

This can be accomplished, he believes, through relatively inexpensive supplemental irrigation in the humid eastern states.

"There are thousands of farms in the humid states where water is available and where the necessary investment in supplemental irrigation—light, inexpensive mobile systems—might pay off. There are more than 100 medium and large rivers in the eastern United States that flow year round. Adjacent to them are more than

50,000,000 acres of well drained land. Modern engineering would permit tapping these streams for supplemental irrigation without damming them.

The opportunities to supplement rainfall on the rich valley lands of the eastern United States are enormous. During the last few years, supplemental irrigation has been tried by farmers in the humid region with profitable results on orchards and on small fruit and vegetables and with encouraging results on pastures and certain field crops.

So much for the bright side of a transition that is both inevitable and, for the land and most men, promising. There remains the mounting problem of human displacement. It is easier to effect an agricultural revolution than to make room for those who are uprooted by that revolution. There are in the southern states, more than 6,000,000 people—most of them negro—who are being disadvantageously affected by proper land use.

The more skillful and better educated are finding a place on the tractor's seat and in the plantation mechanic's outbuilding, and are earning more than their fathers dared dream of. But they will be at best no more than one in four when the transition is complete.

It is estimated that Mississippi has lost since 1940 more than 250,000 of the 1,000,000 Negroes who made up approximately one half of its population ten years ago. Alabama and South Carolina will show a smaller but as significant a decline. The big cities of the East, and now more especially those of the Middle West and the Far West can tell you where many of them have gone, but they cannot give the answer as to how the newcomers and their gathering brothers will be absorbed. The switch to cattle and to new crops, and the mechanization of the southern farm, helps the majority; in terms of national defense and the restoration of the land, the change is welcome; but for the minority which weighs upon America's conscience, no profit accrues.

Do You Know?

More than one third of all farm fires are started by lightning, according to the National Fire Protection Association.

"Your Health"
—The Pennsylvania Medical Society

How to Choose a Hybrid Corn

Condensed from the Michigan Farmer

E. C. Rossman
Michigan State College

A LARGE number of corn hybrids are offered for sale each year in Michigan. While the large number of hybrids available is often confusing and makes it difficult to make selections, there is one advantage in favor of this situation that is frequently overlooked.

A number of generally adapted hybrids that differ in their individual characteristics is desirable for its stabilizing effect on corn production over a long period of time. Stability of crop production is important both from the standpoint of the individual farmer and the national economy. Specific weather and soil conditions, or a sudden large scale outbreak of disease or injurious insect could cause a serious or even disastrous reduction in the total corn crop if only a few hybrids were being grown and these hybrids were sensitive to the particular unfavorable disease or insect. On the other hand, with many different hybrids, some being more tolerant or resistant than others to various unfavorable conditions that may arise, the drop in total production in a bad year is likely to be less.

To provide some degree of stability of corn production on the individual farm as a form of "crop insurance," 2 or 3 hybrids that differ slightly in maturity and other characteristics should be grown. If one hybrid runs into unfavorable weather at a critical stage in its development, the other hybrid may be less affected and come through with a good crop.

Hybrid corn trials are conducted annually at 8 locations in Michigan by the agricultural experiment station in cooperation with hybrid seed corn companies, the cooperative extension service, the Michigan Crop Improvement Association, and farmers. Purpose of these trials is to determine the adaptation of a large number of corn hybrids to the various sections of the state. Comparable information on yield, maturity, lodging, and other agronomic characters is obtained. Farmers, seedsmen, and county agents find the data helpful in making selec-

Reprinted by permission from the Michigan Farmer
Detroit, Michigan, February 2, 1952

tions and recommendations for the proper hybrids to grow in each area of the state.

The following factors should be considered in choosing a corn hybrid.

The 1951 corn growing season again emphasized the importance of early maturing corn for Michigan. The possibility of an early fall frost is probably the greatest single hazard to corn production in Michigan. Planting early maturing hybrids is the best way to avoid this hazard. Hybrid corn trials in Michigan show that it is not necessary to grow a late hybrid to get a satisfactory yield. In fact, some of the early hybrids yield as much or more corn than the late hybrids. The following advantages are presented in favor of choosing early maturing hybrids:

(1) Good yielding early hybrids will usually yield as much or more corn than the late hybrids in most seasons in Michigan.

(2) Earlier harvest is possible in the fall when weather conditions are more favorable. Early harvest reduces corn losses from broken stalks and dropped ears in the field.

(3). Lower moisture content at harvest permits safer storage. More clean, sound, high quality corn will be taken out of the crib.

(4) Mature, dry corn makes better feed for livestock.

(5) Fall plowing of corn stubble is frequently possible with early hybrids.

There are marked differences in yielding ability of different hybrids within each maturity group. Some hybrids are "flash" hybrids. They give an excellent yield in one season but are unable to repeat this performance in other seasons. It is, therefore, desirable to choose a hybrid that has a good yield record for at least 2 or more years.

Yield and maturity of corn cannot be accurately determined by "looking" at the corn. Yield estimates based on the size of ear are particularly misleading since the large-sized ears may be high in moisture, low in shelling per cent, or they may be a result of thin stands which do not give maximum possible yield. It is difficult to detect yield differences of 10 per cent, or even 25 per cent, without accurate measurement of weight and correction for moisture and shelling percentage.

It is a mistake to judge or select a hybrid on the basis of the way it "looks." A "good looking" corn may actually cost the farmer several bushels of corn per acre. Characteristics of yield, maturity, lodging resistance, etc., are of much more practical importance to the farmer than "looks."

The ability of a hybrid to stand erect until harvest is important because broken or leaning plants interfere with the ease and clean-

ness of mechanical harvest. A high percentage of lodging usually means that a lower yield will actually be harvested since ears on broken or leaning plants are frequently missed by the picker. When lodging occurs before the kernels have matured, the grain may be shriveled and lower in test weight. When the ear is in contact with the ground it may become moldy or be eaten by birds and rodents. Two forms of lodging occur. Breakage of the stalk below the ear is generally a result of corn borer infestation, or stalk rot diseases, or a combination of both. Leaning plants may be a result of weak or diseased root systems. The amount of stalk lodging and root lodging is increased by wind.

Approximately 73% of the corn grown in Michigan is harvested for grain and most of it is harvested with mechanical corn pickers. The ease and cleanness of mechanical harvest is dependent upon a number of factors. Type of picker, adjustment of picker, speed of picking, time of harvest, weather conditions at picking time, maturity of the corn, and amount of lodged corn are some of the factors that affect the quality of the picking job. These factors have a greater effect on the kind of picking job that is done than the differences among hybrids. There are varietal differences that affect the quality of mechanical harvest but these differences are, in turn, affected by the mechanical and environmental conditions existing at the time of harvest. A particular hybrid may pick clean under one set of conditions and it may pick "dirty" under a different set of conditions.

Varietal characteristics that may have some effect on the way the corn picks are average height of ears; uniformity of ear height; length of ear shanks and their resistance to breaking; lodging; ear shape; moisture in the ear; tightness of husks; and resistance to shelling. The degree of importance and the effect of these characteristics are dependent upon mechanical and environmental factors listed above. Hybrids that are most desirable from the standpoint of maturity, yield, and lodging resistance have generally been found to be satisfactory in husking characteristics.

Where corn is grown for silage, slightly later maturing hybrids may be used to advantage since they generally produce more fodder and give greater tonnage of silage. Grain production is important in making the best quality silage. Therefore, the hybrid selected for silage should also have a good record for grain yield. If the silo must be filled by Septem 1st, the hybrid chosen should be one that will normally be fully mature by September 15th. Corn should be cut for silage when the

grain has reached the medium dent stage (about 50% moisture). At this stage, the total moisture content of fodder and grain will be high enough for preservation of good silage. If harvested too late there is a loss of dry matter through disintegration of stalks and leaves. When harvested too early there is a loss of grain in the silage.

GET THE FACTS and then decide on the variety. Be sure the seed you buy is the variety adapted to your farm and that it will produce a good corn crop.

Buy seed on the basis of variety and quality of seed rather than on the basis of price. Seed corn is one of the cheapest seed crops on the market when figured on cost per acre for seed. The higher priced seed is not necessarily the best. Likewise, the lower priced seed is not necessarily the best bargain.

How Much Milk Will a Cow Give?

Condensed from the New England Homestead

YOUR answer, of course, will be that it depends entirely on her breeding and the feeding program carried on by the farmer. That's entirely true. Right now, however, we're interested in the feeding part of the farm program. The immediate problem is to produce more milk with the cows you have.

Now underway at the Agricultural Experiment Station of Rutgers University in New Brunswick, N. J., is a five year dairy study. The particular purpose of this program is to find out just how much milk the dairy cow is capable of giving when fed a diet of high quality roughage.

The 30 cows in this experiment have been divided into three groups. One group received roughage and grain at the ratio of one pound for each six pounds of 4% milk. The second group received roughage and grain at the ratio of one pound for each three pounds of 4% milk and the third group received nothing but roughage.

The roughage fed during the barn feeding periods was of the highest quality, classified as U.S. No. 1 extra green leafy second and third cutting alfalfa hay and corn silage. The pasture on which the cows were grazed was a grass legume mixture maintained at a high level of fertility.

The dairy researchers in charge

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Springfield, Mass., January 26, 1952

made the following conclusions: The most profitable level of grain feeding at present prices would be at the rate of 1 pound of grain to 6 pounds of 4% milk. This is true, of course, if high quality roughage is being fed. Such a program they feel would produce the greatest net income. They caution, however, that this prediction is made on the basis that you use the highest quality roughage—roughage that is far better than most dairy farmers are now producing.

It is possible, they point out, for dairy farmers in New Jersey to produce roughage equal in quality to that used in the experiment, but that very few are now doing it. Improvement in roughage production, they say, offers Northeastern dairy farmers their best means of cutting the cost of milk production. The feeding of inferior roughage simply means that grain feeding must continue at a higher rate in order that the cow produce the milk of which she is capable.

Beefmasters

Condensed from the Breeders' Gazette

A SIGNIFICANT experiment in the present-day cattle world is being conducted by the Lasater Ranches. Their strain is called the Beefmaster. No effort has been made to establish a herd registry, though the Beefmaster name has been copyrighted and, under a name franchise contract, buyers are permitted to make use of it. No attempt has been made to fix any one breed color, nor to establish any uniform markings, such as distinguish the white-faced Herefords.

In the growing of the new strain, however, three breeds have been blended. There is no exact blood percentage, but a little less than half of the percentage is Brahman, with the rest about equally divided between the Hereford and Shorthorn. The general idea is definite and clear, though: to grow cattle which will produce more beef at lower cost.

The beginning of this ambitious project was made at the Lasater Ranch near Falfurrias, Texas, in 1908. The founder of the enterprise, Ed C. Lasater, kept it going till 1930, and his descendants have continued successfully the work he began.

Not content with success in hot South Texas, in 1947 the Lasaters

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took a herd of past-two-year-old cows into the Texas hill country, near Mason. There, several hundred miles from the place of their birth these cattle were placed under the supervision of Walker White, a leading stockman of that area. Records were kept, and they showed that the new strain of cattle could and did thrive in higher and cooler regions. On Oct. 1, 1948 the Beefmaster bull calves in this herd averaged 668 pounds at an average age of 8 months and 3 days, having gained at the rate of 2.63 pounds per day from April 5, 1948 to Sept. 1, 1948. The heifer calves on that same date weighed 563 pounds at an average age of 7 months and 28 days, having gained at the rate of 2.17 pounds per day from April 5, 1948 to Sept. 1, 1948. These calves were range raised without supplemental feed.

On Sept. 1, 1948 the 11 three-year-old dry cows averaged 1,399 pounds. The two-year-old herd bulls weighed 1280 and 1412 respectively, and the three-year-old herd bull weighed 1904. On Sept. 13, 1949 the Beefmaster bull calves in this herd averaged 613 pounds at an average age of 7 months and 19 days and the heifer calves averaged 576 pounds at an average age of 8 months and 11 days. These calves were also range raised without supplemental feed under very dry range conditions.

In evolving the Beefmaster strain the Lasaters selected six essentials or characteristics which their cattle must have, and discarded all others as unimportant.

The first of these characteristics was *disposition.* An intelligent, responsive disposition was sought, so that the owner could work, feed, and manage his herd in the most efficient manner. Its presence in stock meant dollars in the bank at marketing time.

Fertility was a second characteristic sought. Any animal which failed to produce regularly or consistently well was culled from the herd regardless of other favorable factors.

Weight was the third essential demanded, for it is the common denominator of the beef business, the factor which goes far in determining the value of a beef animal. It was assumed that the cheapest way to produce and properly distribute weight was through breeding.

Conformation was the fourth essential. The aim was to produce a beef animal that would yield the greatest number of pounds of the most desired cuts of beef. Too, they wanted to increase the dressing percentage and the dressed beef grade, the two most important factors to the packer. That animal was considered best which "had it where the packers wanted it."

Thriftiness was the name given

the fifth requirement—the animal's ability to maintain a healthy, vigorous body under range conditions and without the aid of man. The ideal range cow was to have a high resistance to disease, heat, and insect pests, including the screw worm.

Disposition, fertility, weight, conformation, thriftiness, and milk production: these constitute the ideal qualities that the Lasaters wanted their cattle to have. They have concentrated on these. The color of their animals is not fixed; some are red, others brindle, others with a variety of shades. If a cow turns up with the white face of her Hereford ancestors, that is all right; if she has the color markings of a Brahman, no one objects. As long as she conforms to the above six essentials, all is well.

It is claimed that under South Texas range conditions the Beefmasters will outweigh other cattle by 30%; that without supplemental feed Beefmaster calves will average about 600 pounds at 8 months. It is asserted that they are docile, and with proper management can be handled even under brush country conditions in large pastures and still be gentle. Wildness is commonly regarded as one of the chief defects of their Brahman ancestors. The claim is likewise made that the Beefmasters are good rustlers, willing to travel long distances for feed and water and to graze in the hot sun when other animals are lying in the shade. It is further stated that they show strong resistance to screw worms, ear ticks, and other insect pests, as well as to the more common diseases.

It is also claimed that Beefmaster calves raised under range conditions without supplemental feed, will yield about 60% to 61%, and grassfat Beefmaster cows about 59% to 60%. Tests have been made too, confirmed by packers, showing that there is no practical difference between the quality of beef in a Beefmaster and that of any other beef animal. They also cross successfully, the maximum benefits appearing in the second and third generations. They may be bred successfully as yearlings, but in that case the heifer which is bred should be kept on a pasture and not in a feedlot, as exercise is essential.

One of the big talking points for the new strain is that they can go directly from the pasture to the packing house without further feeding; but the companion claim is made that if they are fed, they show remarkable gains. In that connection the Madera Valley Experiment Station at Balmorhea, Texas, put 112 calves of five different breeds on a winter feeding test. A Beefmaster bull calf made the greatest gain of the lot.

Should Grocers Buy Eggs?

Condensed from Poultry Tribune

G. D. McClaskey

A LARGE majority of farmers who keep small laying flocks are still using the age-old practice of taking their eggs to grocery stores and receiving groceries in exchange.

It is a practice that dates back to the time when most products from the farm were bartered for goods the farmers wanted. This practice has changed—except with eggs. And it would be changed with eggs if grocers would abandon the idea that they have to buy eggs to hold their farmer trade.

Grocers might as well contend that they have to buy the farmers' cream and chickens, or even his pigs, in order to keep the farmers coming to their stores. For no particular reason, they think they must buy the farmers' eggs.

If you talk with the grocer on this subject, it's likely he will tell you that it's pretty much of a nuisance to be dealing in eggs, and that he's lucky if he breaks even on them. But he will add that there's nothing else he can do because his competitors buy eggs from farmers, and if he didn't do the same, he would lose business. Neither he nor his competitors give thought to making a move toward eliminating the practice.

They go on buying eggs and letting them accumulate in the back rooms of their stores. Then, usually not oftener than once a week they'll dispose of them to the dealer or the operator of an egg processing plant.

More than 20 years ago, a man who was prominent in the egg business at that time predicted that within 10 years grocery stores would be out of the egg buying business. But here we are, more than 20 years after that prediction was made, with the big majority of grocers throughout all farming areas still trading groceries for eggs.

Grocers are not equipped to buy eggs. A slogan, which should be emblazoned before the eyes of anyone who has anything to do with eggs, is: *"For eggs to be good, they must be kept cool."*

Go up and down the land, and you'll be lucky if you find a grocer, whose practice is to buy eggs from farmers, who has any facility for

Reprinted by permission from Poultry Tribune,
Mount Morris, Illinois, January 1952

keeping eggs cool. Most grocers of the kind who deal in eggs do not give thought to protecting the quality of the eggs they sell at retail. Any grocer dealing in eggs, who does not have proper cooling facilities for protecting the quality of the eggs, should get out of the egg business, because he is a retarding factor in this business of handling an important perishable food product.

There can be no real objection to the operator of a retail grocery store being in the egg business if he carries on his business of dealing in eggs in a separate room or building and has a set-up to handle eggs properly, but most grocers who deal in eggs are not inclined to operate that way.

There is some kind of an egg law in about every state that has any kind of a rating as an egg-producing state. But, regardless of these laws, most grocers go along in the same old way—violating the law, without qualms of conscience. In fact, in many states, little or no effort is made to enforce the egg handling law.

An attempt was made in a midwestern state, during a recent session of the state legislature, to pass a law that would require all first buyers of eggs to use egg candling equipment. The proposed law also required a separate holding room in which the temperature would not be higher than 70 degrees F. at any time. That was a lenient proposal concerning temperature because 70 degrees is a little warm for retaining good quality eggs.

The draft of that proposed law was referred to the committee on agriculture. Most members, if not all, of this committee were farmers, and most of those farmers produced eggs. Most of them came from communities where eggs are still bartered for groceries.

What did the small town grocers do? They rose up as one man and came down hard on that legislative committee. They would not stand for that provision which required candling. They didn't have time to candle them, since most of their eggs were received on Saturday, their busiest day. The legislation committee was sympathetic. The candling requirement was changed to relieve the first buyer of that chore.

Should grocers buy eggs from farmers and traffic in them as a business, when they are unwilling to protect the quality of the eggs for people to eat?

Some good reports are being heard. One is that all of the grocers in some towns have gone out of the egg handling business, rather than comply with the egg candling law. Now, when farmers bring in their eggs, they take them to the produce house. They collect their money on the spot and then buy their groceries. The eggs have gone into a cool room. They will be better eggs for consumers than

if they had been held for several days in a grocery store. It isn't likely that any grocer in that town has lost any of his farmer trade.

There's a country town in another midwest state where, without enforcement of any egg law, the grocers have not dealt in eggs for years. They may buy some eggs from farmers for their retail trade, but they stop there. Usually, however, they purchase the eggs that go over their retail counters from one of the local produce houses that has a grade-buying program in effect. The grocers handle the grades their trade calls for. It's likely there are a number of towns scattered over the country where a similar situation exists, but such situations are greatly in the minority.

There's tremendous opposition to candling laws on the part of both grocer-dealers and small produce dealers. Because of this opposition, egg candling laws are difficult to enforce. Complete and effective enforcement would require about as many enforcement agents as there are egg dealers. Until such time as egg dealers give thought to compliance, rather than wait for inspectors to clamp down on them, enforcement of egg candling laws will be a difficult problem.

The matter of keeping eggs cool is vitally important. This applies all along the route from the farm to the retail counter. Candling and cooling equipment are each important, but if we have to choose one or the other, let's make provision wherever eggs are handled to keep them cool. If the grocer who deals in eggs won't do this, then he should not be in the business of dealing in eggs.

Lime Fertilizer Needs of Birdsfoot

Birdsfoot trefoil promises to improve both yield and quality of hay and pasture on dairy and livestock farms. It will grow on rather acid soils of low fertility, but won't thrive. Good seedlings require lime and fertilizers. Lime to about 6.5 for best results before seeding. Thereafter one ton of lime every four years should be enough. On highly fertile or manured soils, use about 400 lbs. of superphosphate per acre. On light or low potash soils, use enough 0 : 1 : 1 fertilizer to supply 60 lbs. each of phosphoric acid and potash. This is equal to 300 lbs. of 0-20-20. On unmanured soils of low fertility, use 200 lbs. 10-20-10 and on light, potash-deficient soils, 250 lbs. of 8-16-16 or equivalent.

—American Agriculturist

A Young Farmer With A Future

Condensed from Acco Press

THE NATIONAL MEETING of the Future Farmers of America is held each fall in Kansas City just preceding the American Royal Livestock Show. It is always well attended by young men from the nearly 8,000 FFA chapters in the 48 states, Hawaii, and Puerto Rico. This year, the 24th annual FFA meeting found six thousand boys in attendance.

Many honors come to these young men who attend the national FFA meeting. They have been selected to attend on the basis of their achievements, and the Future Farmers organization has a definite yardstick in measuring accomplishment in the form of records, figures, and balance sheets. Spirited competition exists between chapters for the emblem awards in the national chapter contests, and only 78 awards were made this year.

Highlight of the national FFA meeting is the naming of the four regional Star Farmers, and from this quartette the Star Farmer of America, highest honor offered for achievement by the Future Farmers of America. The Future Farmers of America Foundation rewards these regional winners with $500 checks, and a check for $1,000 goes to the Star Farmer of America. The Foundation, supported by 120 American business firms, organizations, and individuals, sponsors an award program totaling about $95,000 annually for FFA members.

This year, a 21-year-old farmer and Hereford breeder from Freedom, Oklahoma, was named the Star Farmer of America, after he had captured the Southern regional honors. Other regional winners were Joe Harris, 20, Eagleville, California, Pacific Region; George Williams, 19, Nicholasville, Kentucky, Central Region; and Ralph G. Sanner, 21, Kutztown, Pennsylvania, North Atlantic Region.

It's a long road to gain such recognition. The winner is chosen from the 295 candidates for the American Farmer degree. To achieve that American Farmer degree is in itself a high honor, since it is limited to one FFA member in one thousand. Outstanding accomplishments in farming and rural leadership, along with evidence of the young man's successful establishment in farming, are the principal con-

Reprinted by permission from Acco Press,
Houston, Texas, November 1951

siderations used in determining winners of the Star Farmer awards.

These award winners cleared their first hurdle last spring, when their degree applications were selected by their respective state FFA leaders for submission to the national FFA office. There they were reviewed by the National FFA Board of Student Officers and then by the FFA Board of Directors. Later a committee of the Agricultural Service of the United States Office of Education selected the top candidate from each of the four regions. The final judging came in September, when a group of ten nationally-known business men met in Washington and selected the Star Farmer of America from among the four regional winners.

Here is the record of this young Oklahoma farmer selected as the Star Farmer of America. DeWayne Hodgson has defied all the sage sayings and advice found in textbooks by marrying his high school sweetheart and borrowing money on which to get started in farming. Today, DeWayne Hodgson owns a 320-acre farm worth $14,000; at the time his application was filed last spring, he had livestock valued at $9,538; farm machinery, equipment, and buildings worth $7,265; growing crops estimated at $6,000; and miscellaneous assets totaling $742.00. He had liabilities of $7,450, including a $6,500 mortgage on the land, to leave a net worth of $30,495.40. He operates an additional 225 acres of rented land.

Since he began a study of vocational agriculture at Freedom High School in 1944, DeWayne Hodgson has earned a net income of $24,960.66. In addition, through improvements in soil and buildings, he has added $7,000 in value to the farm that he bought for $8,500 in 1949. Of the total income, $20,625.66 came from his farming program. He realized $2,000 from sale of half the mineral rights on the farm, netted $1,280 for outside work, mostly custom harvesting, and received $820 working as a PMA surveyor's assistant. A native of Northwestern Oklahoma where farm boys learn to ride horses as soon as they're big enough to climb in the saddle, DeWayne's report shows earnings of $235 in rodeo prizes!

DeWayne Hodgson got his start in farming at five years of age, when his father gave him a heifer. By the time he entered high school, the young rancher was well on his way with nine cows. The herd has now grown to 25, of which 18 are high-quality registered Herefords. In more recent years, he has added registered Chester White hogs to his enterprises, has 23 of them.

In 1947, during his junior year

in high school, DeWayne rented a 320-acre farm from his grandfather, Robert Hodgson, land that had been homesteaded in the "Run of '89." DeWayne increased his projects to include 115 acres of wheat and 20 acres of barley. He paid one-third of the crop as rent, and paid an additional $50 a year for the use of the 150-acre range pasture.

By 1949, young Hodgson and his high school sweetheart, Lillian Seivert, decided that he was far enough on his way in farming that they could get married. The grandfather took their personal note for $8,500 and turned over the 320-acre place to them. DeWayne had been farming the land for two years, but the buildings were run down, weeds were as high as your head, and the yard hadn't been fenced in years. The house, which had been used as a granary, needed repairs and paint. The barn was little more than a pile of rotting lumber. The new bride found herself in the middle of a real improvement project.

Now, two years later, the DeWayne Hodgson family has a neat, comfortable, rebuilt home, complete with electricity, running water, and a modern heating plant. Their son, 15-month-old Rocky Dean, can roam the fenced and landscaped yard in safety, and a concrete block barn provides shelter for livestock and storage for feed.

DeWayne is quick to give Lillian credit for much of the work. "I've got a wife who works as hard as I do," he said. "She drives the tractor and the truck. She helps take the cottonseed cake and grain sorghum bundles out to the cattle. She can make or mend a fence as well as I can. She cuts the weeds, and can run the combine. She rides a horse just about every day, looking after the cattle. We start our work day at five o'clock, and in the wheat harvest period, we're still at it at nine o'clock at night."

DeWayne Hodgson has improved his land, too. When he first rented the place from his grandfather, he had a good crop year yet made only 12 bushels of wheat to the acre. Stories of the days when 40-bushel yields were common seemed rather farfetched. He terraced the land, plowed on the contour, planted cover crops, and used other soil improvement practices to bring the yield up to 18 bushels to the acre.

DeWayne has found time to be a leader in high school and the community, too. He was a class officer every year in high school, served as secretary and then as president of the Freedom FFA Chapter, was elected secretary of the Oklahoma State FFA Association for 1948–49. He was captain of his school basketball team, a member of his school baseball

team. An accomplished feeder and showman, he had won several prizes with his livestock in local and state fairs, and was a member of the three-man Freedom FFA Livestock Judging Team that won first place in two state contests.

Quite a record for a young man to have written in such a brief period, this work of DeWayne Hodgson of Freedom, Woods County, Oklahoma, Star Farmer of America—and a farmer with a future.

The Best Steer To Eat Grass

Condensed from Successful Farming

D. Howard Doane
Doane Agricultural Service

SOME steers are good-doers and some aren't. It works that way in the feedlot, and it's just as true out on pasture—the only difference being that the good feedlot type may turn out to be a pretty poor converter of grass into beef.

I recall one bunch of cattle where the top steer made a 4-pound gain per day during a 100-day grazing period, while the poorest managed to put on only about 1 pound. Average for the bunch ran at 2 pounds.

Many farmers, wishing to make greatest use of their grass, actually pick the kind of steers suited only for making gains from grain in a feedlot. With our new emphasis on soil conservation and cheap gains from forage consumption, we may see a new type of steer taking shape.

Most of us have noted only average gains on the various bunches of steers we have handled, little suspecting the great variations that might be found *within* the bunch. We have noted that some steers seemed to do better than others, but not having exact figures, we have continued doing business on the basis of averages. And averages may be dangerous guides.

Realizing this fact, we ran on my grassland farm a test during the winter of 1949–50 and the following grazing season, to find out the relationship of steer type to grass gains. On April 11 we turned 52 head of 2-year-old steers on an excellent, modern, well-fertilized pasture.

A group of us selected 5 steers each. Each steer was banded and numbered. Once each month

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Des Moines, Iowa, May 1951

every steer with a number was weighed and his gain was recorded.

On September 21, about half the lot was put on a dry pasture and given about two weeks of corn to condition them for shipping. About two weeks later (October 2) the remainder were treated in a similar manner. We had a little foot trouble and some minor difficulties, so that only 17 of the original 20 head that were marked were finally compared.

By referring to the table, you can see the gains made by five individuals from the group of 17 steers. They represent the best, the poorest, and some in-betweens. I spent quite a little time observing these steers during the summer. Notes were made on all features or characteristics that I could observe. As the figures are studied, these comments will be of interest to you.

The rank some of us gave these steers varied at the start of the test. For example, one man put No. 3 first, and one placed him second. No. 2 was placed first by two men and second by one. No. 1, on the other hand, was placed last by one man; all the others ignored him entirely.

Naturally the steers were pretty well shrunk out when they went to grass on April 11. It was not easy to judge one important factor, namely, amount of middle they carried. However, we made our selections and someone of the group made a placing on all of the 17 head.

Take a look at steer No. 3. When we did a little guessing before this test started, two of us gave him favorable consideration. He had big bone; short, broad head; and, while he lacked some middle, it appeared he might fill out.

Note (from the table) that during the first 25 days on pasture he

GRAZING PERIOD	GAIN	1	2	3	4	5
April 11 to May 6	Daily	1.20	.40	−.80	0	0
	Total	30.	10.	−20.	0	0
May 7 to June 14	Daily	3.97	2.82	2.95	2.56	2.05
	Total	155.	110.	115.	100.	80.
June 15 to July 15	Daily	3.22	3.87	2.74	1.77	1.94
	Total	100.	120.	85.	55.	60.
July 16 to August 18	Daily	.74	1.76	.29	1.32	.88
	Total	25.	60.	10.	45.	30.
August 19 to September 21	Daily	3.11	2.35	2.00	2.06	1.78
	Total	106.	80.	68.	70.	60.5
September 22 to October 2	Daily	3.11	Off	2.00	Off	1.78
	Total	34.	grass	22.	grass	19.5
Final Weight		1,260	1,260	1,100	1,180	1,070
Starting Weight		810	880	820	910	820
Total grass gain		450	380	280	270	250
Average daily gain		2.60	2.33	1.61	1.66	1.44

stood last, losing .8 of a pound per day. Again, when the going was hard in July–August he again stood at the bottom. In the end he was among the tail-enders of the whole bunch. He is the type that can fool you.

Now look at the record of No. 2. This steer was out of a grade Milking Shorthorn cow, by a purebred bull of the same breeding. He had been clamped and, as a result, developed, acted, and sold as a stag.

He was the type that has most often stood at or near the top during all our testing. He had big bone, big frame, big middle. If he had spent less time bellowing and pawing and more time converting grass to beef, he would have been, in my opinion, the top gainer.

This steer was one of my pair of lawn mowers. He would start out and mow a straight line, through thick and thin, high and low, grass and clover. In my judgment he put away a greater *volume* of grass than any other steer.

He is the type to watch. If he ever got near a show ring he would, without question, stand so far down the line it would take field glasses to see him. But I would like to buy 100 like him every year.

Worst steer of the lot was No. 5. This steer made the least grass gain, only 250 pounds—less than a pound and a half per day.

If this bunch of cattle had been in a show ring he would, I believe, have stood second. He was pretty well balanced, had a straight top line, short neck, and broad head.

As a grazer he was just opposite to Nos. 1 and 2. He grazed selectively. He seemed to prefer the short growth, taking a bite here, walking a few steps, and then taking another bite. I am sure his small gain reflects his relatively small grass consumption.

Nos. 1 and 4 are unusual steers. I feel certain they came out of the same herd. They were so near alike I could not tell them apart at a distance. They both had long, narrow heads; fairly long necks; fine, slick hair; and fine bone.

They had these differences, however. No. 4 was nervous. No. 1, his half-brother (I guess), was quiet but kept his mind on his business. He walked that pasture to get grass, and he went after it early and late. He was the other lawn mower. Almost always he was among the last to bed down in the morning and first out after bedding. He was no pet, because he was too busy getting his share of Ladino.

His other characteristic—and this is what counts—was his very large middle. When he stood with his back up, his paunch pulled his back down until he was sway-backed. I have never had another steer like him. He probably would score lowest on any student's score

card.

Note that he made top gain the first weighing period. The next period he made almost 4 pounds per day, and over 3 pounds the next period. His grass gain was 450 pounds. Not shown in the table, but revealed in my records, is the fact that he made a 600-pound gain from grass and hay from purchase to sale, but lost 17 pounds during the winter. That makes a total of 583 net pounds of gain.

Running through those weight figures brings up the question of how much dead time we have on pasture in the summer. You will note from those figures that all steers dropped off on daily gain between July 16 and August 18—even though last summer the grass was unusually good, the weather cool, and flies relatively few.

What would have happened with these steers—or anybody's steers—under normal or poor midsummer grazing conditions? Would it be possible to avert such drop-offs through supplemental feeding, irrigation, more effective fly sprays, or use of a Brahman cross?

My records show one other interesting fact. Nos. 3 and 5, poor grass gainers, made 50 pounds each at the feed bunks, while one of the two top grass gainers, No. 2, made no corn gain, and No. 1 made only 10 pounds.

No. 4 was so nervous he would not come up to the bunk to eat. He lost 20 pounds in 10 days. Nos. 3 and 5 are the type Cornbelt feeders have always selected and, judging from these cases, it appears they have not been far off so far as grain feeding is concerned.

The matter seems to simmer down to this question: As we go from the long dry-lot corn feeds to making beef from grass, does the same type of steer fit both places equally well? Our experience indicates that the show-type of steer that has done best on long corn feeds *is not* the steer that will do best on grass. It appears that we need some new yardsticks for measuring grass gainers.

There are those who scoff at these little test-observation trials we are making, saying it gets us nowhere as long as we work with steers that go to the block at the end of each season. I should like to make it clear that all we are attempting to do is to train our eye to detect the type of steer we need for our new grass-feeding operations. If we can do it, the study should pay off fairly well.

For example, if we had bought Nos. 1 and 5 at 20 cents, grazed them 165 days, paid a $10 grazing bill for each steer, and then sold them for 20 cents, here's how they would have stacked up: No. 1 would have left up a profit of $79, while No. 5 would have made us only $41.

These cattle actually brought $28.40 (with no grain feeding except for the dry-up feed), while beside them at the stock yards were cattle at least one grade better which brought only $29. Tops for that day for long-fed Choice yearlings was $31.

Our system in summary is this:

1. Buy 2-year-olds in September and let them clean up pastures left by cattle sold about the same time. (These cattle gained 1.57 pounds per head per day from September 20 to the last of December on leftover pastures).

2. Winter them on saved-up bluegrass, and feed only when snow covers the ground. These cattle got low-grade hay and straw, and lost an average of 26 pounds between December 24 and April 11. They had no grain. Naturally, they were pretty well shrunk out when they went to grass on April 11.

3. Hold on bluegrass until clover is ready in April, then turn on a modern, heavily fertilized pasture.

4. To hold down bloat, give them access to bluegrass. Or, if you have no bluegrass, keep hay available. Spray for flies.

5. Near October 1, dry up for 10 days to two weeks on dry pasture, hay, and corn. (These cattle shipped 100 miles with almost no shrink).

6. Select big, rugged cattle, grading Good, and finish them only to Good when going to market. If an 800-pound steer, bought at 20 cents, makes a total gain of 400 pounds, he can be sold for less than 14 cents and return all the cost. If he sells for 15 cents, our experience shows he will return his cost and pay farm value of rough feed fed during the winter.

When we can pick them all like Nos. 1 and 2, we should get along all right.

Tractor motor gets hot and dry? Let it cool before you put water in the radiator. If you don't, you may crack your engine block.

How Valuable is a Herd Sire Index?

Condensed from the Holstein-Friesian World

Dr. E. S. Harrison

THE practice of evaluating the dairy bull solely upon a mathematical comparison of the production records of his daughters and the productive level of the cows he was mated to needs careful scrutiny. First of all this practice ignores conformation which is as much the result of inheritance as is the productive efficiency of the daughters of a particular bull. Conformation defects seldom affect the production of a two year old. Type defects, if serious, however, will shorten the productive life and lower mature performance.

Early maturity is also correlated with a short productive life. On the other hand by experience and observation breeders have come to recognize the fact that a large percentage of their great aged cows were only average producers as two years olds. For the purpose of comparison immature records are calculated to a mature equivalent basis. The early maturing high producing two year old is unlikely at maturity to equal her calculated mature equivalent record while the slow maturing heifer is almost certain to exceed it.

In the case of the high record early maturing two year old a mature equivalent is just a means of making the record look larger. At the same time mature equivalent figures grossly under-estimate the mature performance of a large percentage of the slow maturing heifers.

Even more significant is the fact that a production record of any cow measures her inheritance only when that cow is given a productive opportunity equal to her inherited ability. The productive opportunity provided a cow is affected by so many factors that it is almost impossible to maintain opportunity as a constant factor. Any variation in opportunity will affect the productive level. Production records are therefore in many cases the product of inheritance and opportunity.

The influence of opportunity under certain conditions may become so great that it practically eliminates the influence of inheritance. For example a cow carrying an inheritance for 800 pounds of fat cannot produce 800 pounds

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of fat when provided only a 400 pound opportunity. This opportunity factor explains why a certain cow makes only a 400 pound record in one herd and 800 pounds when transferred to another herd. Changing homes did not change her inheritance. In her new home she was provided a productive opportunity that more nearly equalled her inherited ability to produce.

Think what kind of a proving would be obtained on a bull if the cows he was mated to were tested under conditions that provided only a 400 pound opportunity and the daughters were given an 800 pound opportunity. Keep in mind that it is not necessary to change homes to have this difference in opportunity. It would be, therefore, a very simple matter to obtain a high plus proving on a bull of very inferior inheritance. By the same token unintentional failure to provide a productive opportunity equal to inheritance sends many potentially great bulls to the slaughter house.

I would like to discuss a few of the factors that influence opportunity. First and foremost is Man. There exists a serious shortage of skilled dairymen interested in doing a good job and this shortage becomes more acute with each passing month. On the surface there is no single characteristic that would enable one to distinguish between a good dairyman and just help. It is the sum of a lot of little things that add up to interest and a genuine pride in a job well done.

I have just computed some figures on the herd at Harden Farms that indicate the degree to which the completed record can be influenced by the caretaker. Keep in mind that all the cows compared received the same grain ration, hay and silage of equal quality and they were all housed in new modern and comfortable stables. As far as it was humanly possible to control it the only difference in productive opportunity was the caretaker.

For a basis of comparison I chose the first 60 days production and computed the percentage it represented of the final record. I don't expect objection to this basis of comparison because the internal stimuli to produce during the early months of the lactation overcome to a great degree opportunity differences.

Milker No. 1—Qualities—an excellent milker and caretaker. He likes cows, takes pride in his work and knows the importance of following a program and doing things on schedule. Six of the cows in his string have just completed their records:

Cow 1—First 60 days production 5006 lbs. milk. Final record 25545 lbs. milk. 60 days production was 19% of final record.

Cow 2—First 60 days production 4797 lbs. milk. Final record 26428 lbs. milk. 60 days production was 18% of final record.

Cow 3—First 60 days production 4943 lbs. milk. Final record 27452 lbs. milk. 60 days production was 18% of final record.

Cow 4—First 60 days production 5550 lbs. milk. Final record 27928 lbs. milk. 60 days production was 19% of final record.

Cow 5—First 60 days production 5494 lbs. milk. Final record 28720 lbs. milk. 60 days production was 19% of final record.

Cow 6—First 60 days production 5910 lbs. milk. Final record 28664 lbs. milk. 60 days production was 20% of final record.

On the average these six cows produced 19% of their final record in the first 60 days and there was only 1% variation from the average.

Milker No. II—Qualities—an indifferent caretaker, principal interest: pay days and days off. No longer with us.

Three cows that started in his string with comparable productive ability are now far enough along to estimate their final records:

Cow 1—First 60 days production 5890 lbs. milk. Estimated final record 1900 lbs. milk. 60 days production was 31% of final record. On basis of Milker No. 1 she should have produced 30,000 lbs. milk.

Cow 2—First 60 days production 5160 lbs. milk. Estimated final record 20,000 lbs. milk. 60 days production was 26% of final record. On the basis of milker No. 1 she should have produced 27000 lbs. of milk.

Cow 3—First 60 days production 6120 lbs. of milk. Estimated final record 24000 lbs. of milk. 60 days production was 25% of final record. On the basis of milker No. 1 she should have produced 30000 lbs. of milk plus.

The average percent was 27% compared to 19% for milker No. 1.

I realize that a variation of this nature could be explained by a difference in inheritance for persistency of production. In this case inherited persistency is not the explanation because in earlier lactations all three cows had proved to be very persistent producers.

The difference between good caretakers and poor caretakers can influence the progress of a herd to as great a degree as the herd sires used. How often we hear the comment that a particular cow's record was made under just ordinary farm conditions. The inference is that the record should be corrected upward to compensate for the lack of opportunity. I am sorry that I have to admit that in many cases these comments are justified but it should not be so. The large herd depending solely upon hired caretakers should not be able to compete with the

small herd cared for by the owner and his family. The failure of the owner and operator of a small herd to provide the top in productive opportunity is not a case of lacking interest but more particularly a failure to put first things first and attaching enough importance to a routine schedule. The pressure of the farm operation and crop production causes him to unintentionally become guilty of many of the shortcomings of the indifferent hired caretaker. It looks like rain—another hour will see hay in the barn—the cows await their turn; the crops must be planted so the cows are rushed out of the barn without their usual feeding of hay. At the time the reasons seem undeniable and little thought is given to the influence that the disrupted schedule will have upon herd efficiency. Unfortunately this influence is not of a temporary nature.

Man is not the only factor that influences the productive opportunity of a cow. A severe drought accompanied by short pastures or even a lack of water can easily influence the productive level of a herd by 50 or more pounds of fat. Even when short pastures are properly supplemented there will be some loss in production. Excessive rainfall during the haying season resulting in the barns being filled with hay damaged by weather or late cut makes it almost impossible to maintain production during the winter months. A sustained heat wave causes a sharp decline in milk production and the return to normal weather seldom if ever restores production to the previous level. It is possible therefore that favorable or unfavorable weather can influence production to such a degree that it is difficult to measure inheritance. This is especially true should the dams be tested under favorable weather conditions and the daughters tested under unfavorable climatic conditions and vice versa.

Disease or injury can ruin the productive potentiality of the individual. When a bull's proving is based upon as few as five dam-daughter pairs if one used in the comparison was the victim of injury or disease the proving can be rendered worthless and misleading. I have always felt that when the production of a particular individual was far below or above the average of the group that the record should be investigated before including it in the comparison. If the investigation discloses any abnormality that would explain the extreme variation from the average the record should not be used.

I am not foolish enough to think that all these factors can be incorporated into a dam-daughter comparison. My discussion is intended solely to emphasize the fact that breeding high producing

dairy cows cannot be reduced to simple 5th grade arithmetic. I feel that this discussion is especially significant at this time because entirely too much emphasis is being placed upon a plus or minus proving on a bull and too little attention is being given to equal or more important facts.

Remember that behind every great herd whether large or small there is a lot of constructive thinking, careful planning and "know-how."

Turkey Sets Up Extension Service

Condensed from Extension Service Review

"TURKISH county agents are so much like those in the United States they even have to write monthly reports and keep daily summaries," says Harry Gould, former associate extension director in Nebraska. Gould is now adviser to the Turkish Ministry of Agriculture on Extension work. He is a member of the Starch group, a part of the Economic Cooperation Administration Mission to Turkey.

The expanding Extension Service—called Teknik Ziraat Teskilati in Turkey, is attracting to it a group of men who have the same ideals of service and faith in agriculture as the American county agent. This is made evident by their approach to their job and their constant effort to increase their efficiency.

The extension program in Turkey was established by basic law in 1941. In 1943 a comprehensive set of rules and regulations for the service was adopted and the organization has grown since that time.

At present there are Teknik Ziraat Teskilati organizations in 10 of Turkey's 63 provinces, four of them having been established this year. Plans of the Ministry of Agriculture call for establishment of the work in 10 more provinces in 1952.

"Our work with the Turkish government and people is not an effort to model their program after ours in America," Gould says. "Rather it is an attempt to give them the benefit of our experiences, our mistakes and our successes, and then to build a program designed to fit Turkish conditions, Turkish philosophies and Turkish people."

The work is established on a

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different organizational basis than the American Extension Service. In Ankara, in the Ministry of Agriculture, there is a headquarters office, with a national director of extension who handles administration of the entire program. The present director is Selami Uraz, who spent 13½ months in the United States studying extension work in the States of Washington, Texas, and Wisconsin and in the Federal office in Washington, D. C.

Each province also has a Teknik Ziraat Teskilati director who has general charge of the work there. The provincial director has a staff of subject-matter specialists in various fields of agriculture important to the province.

A province is broken down into a number of kazas or counties, and each of these has an agricultural technician who heads up the work. Normally each kaza technician has an assistant.

Working under the kaza technicians are the "village teachers." These men are not teachers in the formal sense but are members of the staff who actually contact the farmers.

Each village teacher has a group of 20 to 25 villages assigned, and it is there that he carries on his work. Turkish farmers, virtually 100 per cent, live in small villages and travel to and from their fields.

The village teacher is required by law to spend 160 days of each year actually in the villages working with the farmers. In the summer his work will consist of many service functions and actual contacts in the field. During the winter months, he holds meetings in the village coffee house or school building and develops the farm program of the area.

Turkish Teknik Ziraat Teskilati regulations require that annual meetings be held on a village, kaza and provincial basis to plan the agricultural programs. These meetings include farmers as well as agricultural workers.

Most of the village teachers travel to their areas on horseback. The government loans them the money to buy a horse, pays them 50 lira (about $18) a month for upkeep. They are required to maintain their animals "so as to set a good example to the farmers."

The village teachers have all completed formal education that would compare to a high school agricultural course. Kaza technicians and provincial directors are largely graduates of agricultural colleges.

Much in-service training is conducted on all levels. Courses are held in subject-matter methods on all major programs undertaken by Teknik Ziraat Teskilati. Gould has participated in many of these to explain the basic philosophy and function of Extension.

"The interest and enthusiasm shown in these meetings is highly stimulating," Gould says. "After we have had a session their discussions are generally long and heated. I may not be able to understand all that is being said but from the translations and even more from the attitudes, I know they are threshing things out in their own minds.

"At one school I used the expression 'helping people to help themselves,' the phrase so familiar to us. It took considerable translation and explanation before they grasped this concept, but once they had it, it became almost the theme of their work from then on."

While the organization of the Turkish Teknik Ziraat Teskilati may be somewhat different from our Extension Service in the United States their methods are the same. The demonstration is the basis of the entire program, supplemented by field visits, exhibits, meetings, and in some areas radio talks and newspaper articles.

Because it is not possible for a man in Turkey to work with a group of village women, and because there are no trained women available, there is virtually no home economics program. However, many Turkish leaders are beginning to feel the need for such work and it will doubtless develop as the program progresses.

"The continued growth of Teknik Ziraat Teskilati is almost a certainty in Turkey. Its expansion will be a big factor in increasing the quantity and quality of agricultural production, and in lifting the living standards of the Nation."

Cow Comfort and Ventilation

Condensed from Electricity on the Farm

C. G. Burress and Harold R. Wakefield
Pennsylvania State College

EVERY building is ventilated. It's pretty hard to build one that isn't. For instance, in any well constructed house, even with storm windows, the air will be changed, naturally, about twice each hour. What's more, it will happen without any doors or windows being opened.

That's sufficient ventilation for many purposes. It's about what you have in your home. You may notice the need for more ventilation when the kitchen gets steamed up from cooking vapors. Or, if you have a group meeting

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New York City, February, 1952

at your house, with a lot of people in one room, you may find the air getting stale and your guests drowsy. But for most household activities the natural ventilation is sufficient.

What about a dairy barn? It, too, has that same natural ventilation only more so. Generally, our barns are not as tightly constructed as our houses. There are bigger cracks around doors, hay holes, silo chutes, windows, etc. But a barn needs more ventilation. A milking herd of cows consumes a lot of oxygen. It produces a lot of vapor in the air it exhales. And it can produce odors a lot faster than a panful of fish. Now, if the barn is opened up enough there will not be any ventilation problem. Instead, you will have the problem of maintaining "cow comfort."

For many years a temperature of 50 degrees in the cow barn has been considered about right. Recent tests at the University of Missouri indicate that at temperatures higher and lower than 50° milk yield appears to decrease. This would indicate that cow comfort is quite important. In view of this, the proper ventilation of a cow stable deserves the attention of every dairy farmer.

There are several problems involved. They include the size and tightness of the barn to be ventilated; the size of the herd, and the temperatures normally encountered during the winter.

Heat for the barn is supplied by the cows themselves. A full grown cow produces about 3,000 BTU (heat units) per hour. When outside temperatures rise, during the day, a lot of heat is produced within the stable that isn't needed. However, when outside temperatures are low much of the heat is needed within the stable. If we're going to ventilate a stable and maintain cow comfort, we'll need a system that has variable capacity. You can't change the air faster than the cows can warm it, without lowering stable temperatures. Yet, you must be able to change the air just as fast as it can be heated. And you must be able to provide this air movement without creating drafts.

A practical answer to the problem lies in the use of automatically controlled electric exhaust fans. Such units are controlled directly by the stable temperature. With a thermostat set at 50 degrees, these fans will remove moisture and odor laden air from the stable as required. The fan's air moving capacity is selected in accordance with the severity of expected outdoor temperatures. It will range from 60 cfm (cubic feet per minute) to 200 cfm per mature (1000 lb.) animal in the stable.

As the ventilating fan exhausts foul air from a stable, fresh air

must enter the structure to take its place. This air may enter through cracks in the wall or ceiling, around windows or doors, or may come through specially provided fresh air inlets.

If the fresh air experiences much difficulty entering the stable, as might be the case with a tightly constructed barn, the fan will have to work harder to induce the air to flow into the stable. This will cut the fan's capacity and will increase the amount of electrical energy required to move the air.

On the other hand, the stable construction may be very loose. Then air can enter so easily that, if the wind blows against the loose walls, the stable is apt to be over ventilated.

Judging from these facts, the *structural tightness* of the stable is a very important item to consider when a ventilation system is being installed. Dairy stables vary considerably in structural tightness. There are some very loose structures and few extremely tight ones. Field observations, however, indicate that most stables fall in the range between moderately loose to tight construction.

Very loosely constructed stables probably were tighter when built. They become looser with age as window and door cracks became larger and as walls and ceilings become more pervious. There is more than adequate area for air to enter without the addition of inlets. Temperature controlled fans usually greatly improve conditions in these very loose stables, but wind, not fans, may cause over-ventilation. Tightening the wall near the fan and closing large cracks in other areas will cause fresh air to enter more uniformly over the stable and will help prevent drafty areas.

Moderately loose to tight construction includes a large percentage of the stables. Older stables tend to be moderately loose and usually have more than adequate openings for air to enter. In these older stables is is frequently necessary to tighten the wall near the fan to reduce "short-circuiting" of fresh air. Cracks about doorways and windows should be closed and hay chutes and silo openings should be covered.

Recently remodeled stables usually make up the "tighter" portion of this group of structures. Tight new masonry walls, tighter doors and windows, and relatively good ceilings are common to the group. A considerable portion of the required air will infiltrate through the walls. In the tighter stables of this class, however, slot inlets may be needed to supply about one-fourth of the air when air is changed at the rate of 200 cfm per animal unit.

Very tightly constructed stables are rare. When they are en-

countered they pose quite an engineering problem. Inlet area must be provided to admit about one-half or more of the fresh air needed. These barns are usually of very recent construction. Side walls frequently are made of well-mortared block or extremely tight frame construction such as plywood. Ceilings are probably of plasterboard, plywood or similar material, and doors and windows fit almost like those in a dwelling.

Most barns will fall into the moderately loose to tight construction group. For this reason, installation of inlets will seldom be required. An extremely tight stable usually requires engineering advice for the design of inlets. This may be obtained from the Farm Department of your power supplier or your state extension service. When installing a ventilating system, let the structure be your guide.

Does your dairy barn need a better ventilating system? Many do. Tighter barns, bigger cows, larger herd sizes, and more crowded conditions have increased the needs for ventilation.

Ask yourself these questions:

Do I have to change from my barn clothes into clean ones before the womenfolk will let me come into the house?

Is the stable air warm, damp, and stale?

Is condensation on walls and ceiling rotting my barn timbers?

If the answer is "yes" to any one of these then it's fairly certain your barn needs better ventilation, and an automatic exhaust fan system may be your answer.

Preventing Cannibalism

1. Don't allow overcrowding.
2. Keep houses as comfortable as possible.
3. Use darkened nests.
4. Have plenty of hoppers and waterers and keep them filled.
5. After chicks are a month old, keep oats before them.
6. Place a bale of good legume hay in the pen for them to pick at.
7. Use a "pick paint" on the injured birds or even on some of the uninjured ones.
8. Get young birds out on range as soon as possible.
9. When all other procedures fail, debeak them, preferably with an electric debeaker.

—*American Agriculturist*

Skillful Feeding Gives Results

Condensed from the American Poultry Journal

Ralston R. Hannas

No longer is it necessary for the poultryman to figure up a ration, shop around for the ingredients, and then mix it himself. Now, most poultrymen buy their feed ready mixed. If any mixing is done on the farm, it is to use home grown grains with a purchased concentrate. In any case, the poultry producer's problem of figuring a ration is practically eliminated.

This doesn't mean that there are no more problems in feeding. The skillful poultryman will continue to get better results from his birds because he watches his flocks and knows when they are out of condition and need special care.

But the development of "high energy" rations, and the discovery of vitamin B_{12}, as well as the discovery of the benefit of antibiotics in feeding—just to mention a few of the most recent factors in feed improvement—have changed the poultry feeding picture considerably.

The "high-energy" rations coupled with vitamin B_{12} led the way in showing how improved growth could be obtained. They showed also how it was possible to get good results with vegetable proteins when supplemented with the vitamin B_{12} factor (referred to then as animal protein factor). Then, more recently, came the work with antibiotics.

Regarding antibiotics, the statement has been made that "One third of an ounce of antibiotic mixed into a ton of regular ration is sufficient to bring broiler chickens to market weight 2 weeks earlier than can be done by feeding the same ration unfortified with an antibiotic. The time saved in bringing turkeys to market varies from 4 to 6 weeks."

Experiments indicate that "antibiotic-supplemented feed produces thriftier animals; increases their livability; reduces the quantity of feed they consume; cuts costs further by scaling down need for animal protein and vitamin B_{12} in rations."

Aureomycin, discovered in 1947, was the first of the antibiotics to receive attention for its results in poultry feeding. These results were considered outstanding. However, for terramycin, discovered in 1949, some claim even better results. In any case, antibiotics have made a real contribution to poultry feeding.

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Chicago, Illinois, February, 1952

The gains made in poultry feeding mentioned thus far have been primarily in growth. Gains have been made, too, in feeding for egg production. We are indebted to the American Feed Manufacturers Association for the following information showing the progress that has been made in feeding for eggs.

"The widespread use of improved practices of feeding, breeding, management and sanitation has made it possible for the nation's poultrymen to achieve the highest production record in history.

"In 1936, egg production averaged 121 eggs per layer. On a national level, each ton of poultry feed produced 3,217 eggs. During the past 15 years, both average rate of lay and egg production per ton of feed have moved upward at a rapid pace. By 1951, production reached an estimated 169 eggs per layer and 4,190 eggs per ton of feed. While the average annual rate of lay was increasing 48 eggs per layer, the number of eggs produced per ton of feed increased 973 eggs.

"As egg production per hen increases, the cost of producing a dozen eggs decreases.

"Feed required for maintaining a flock of hens exceeds 3 times the amount required for egg production, growth and fattening combined. According to the National Research Council, a 4-lb. hen requires 56 lbs. of feed for maintenance, and an additional 14 lbs. for each 100 eggs produced. On the basis of these figures, the average layer in the United States has an annual feed requirement in excess of 80 lbs.

"High feed consumption is the key to high egg production in a flock which has the inherited ability to lay lots of eggs. However, for optimum feed conversion efficiency, the ration must contain the right amount and combination of nutrients essential for body maintenance and high egg production. In addition, the laying flock will return even greater profits when such factors as breeding, management and sanitation are recognized as an integral part of every sound production program."

Common practice is to keep the feed in feeders, or hoppers, in front of the birds all the time, and where grain is fed in addition, this is fed either by hand as a scratch feed in the litter or in separate hoppers at stated intervals. Under certain conditions, restricted mash feeding is practiced.

In order to be sure that layers get all the feed they should have, there must be enough feeders in the pen so all birds will have a chance at it. An allowance of 1 ft. of feeder space for every 4 birds should be sufficient so all birds will have a chance at the feed.

The mash is the part of the ration that provides the protein that is so essential in the production of eggs; the grain provides the part that is necessary for maintenance. Here is where the skill of the poultryman comes in. He must be able to recognize when his birds are losing weight or when they are losing their appetites and are failing to eat the amount of feed they should. Usually, when feed consumption drops, egg production can be expected to drop in about a week.

The following table gives the amount of grain that may be considered as the normal amount to feed per 100 birds per day:

	Leghorns	Heavy Breeds
February	12	16
March	12	16
April	12	15
May	10	14
June	10	14
July	8	12
August	8	12
September	8	12
October	10	12
November	12	15
December	12	16
January	12	18

The poultryman's skill comes in knowing when to deviate from this table or any similar table of recommended amounts of grain to feed. If there is a tendency for loss in weight, it is quite likely that increasing the amount of grain by about a pound per 100 birds per day might help; perhaps 2 lbs. per 100 might be the answer. When weight has been increased and birds are in good condition, the reduction in grain to the normal amount can be made.

This works the other way, too. If birds are too fat and do not eat as much mash as they should, the amount of grain can be cut down for the daily feeding. This is usually the procedure to follow when production drops.

Consumption of mash can also be increased very often by going through the pen several times a day and stirring up the mash in the feeder; each time this is done, it arouses the birds' curiosity and they will jump up to the feeders and eat more feed. Some poultrymen also find a moist mash of benefit in increasing feed consumption. This consists of the regular laying mash moistened with milk or water until it is crumbly and fed once a day as much as will be cleaned up in about 20 minutes—this generally amounts to about 2 lbs. (dry weight) per day.

The use of automatic feeders, which is quite common now, should maintain an even consumption; if not, the feeder may be operated more frequently during the day.

In any event, the poultryman will do well to keep a watchful eye on his flock at all times and know what takes place in the pen. It means going to the pen several times a day and spending a little time watching the birds to see how they go for their feed.

Land-Grant Institutions and Technical Cooperation

Condensed from Foreign Agriculture

Dr. Ross E. Moore
Assistant Director, OFAR

IN 1900, one farm worker of the United States produced enough for himself and 7 others. Now he produces enough for himself and 14 others. As we extend our technical cooperation to other countries, we must be sure to utilize the same forces that in a half century have helped double our own agricultural efficiency. What are these forces?

They may be said to be three; yet, through simultaneous application, they act largely as one. They include research, so that the secrets of successful agricultural production may be unlocked. They include dissemination of research findings to farmers, so that the discoveries of agricultural scientists can be put to use on the land. And they include teaching, so that the field of agriculture will have informed producers and leaders.

In the 69 land-grant institutions of the United States, we find these forces operating effectively and in unison. Although we are proud of the national leadership given to our agriculture by the United States Department of Agriculture, realistically we acknowledge that the farmers of the United States look for their more immediate guidance to the land-grant institutions in their own States rather than to their Federal Government. In our programs of technical cooperation with other countries, then, we have found it not enough that the institutions of our Federal Government take part. In order to bring to the effort the total support of United States agriculture, we are making certain that our "people's institutions"—the State land-grant institutions—also are active participants.

The land-grant institutions are strengthening our technical cooperation programs by performing four basic functions:

Training technicians and leaders from other countries who come to the United States to study agriculture.

Training technicians of the United States to fit them for technical cooperation work in other countries.

Lending the services of staff members to technical cooperation projects in other countries.

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Washington, D. C., November, 1951

Assuming direct responsibility for carrying out technical cooperation projects in other countries.

What are these land-grant institutions that are so vitally important to the agricultural production and the agricultural programs of the United States?

It is probable that they are unique in the world, having no counterpart in any other country. Their origin goes back to the middle of the last century. By that time, widespread protest had arisen in the United States against the traditionalism of higher education, for our colleges and universities were designed then to serve primarily the leisure and governing classes or those entering the professions of law, medicine, or theology. There was increasing public demand for institutions that would serve the needs of all the people. There was insistence that colleges and universities help increase agricultural production and improve rural life, and also there was insistence that there be research and instruction to aid our expanding industry.

As an answer, in 1862, President Abraham Lincoln signed the Morrill Act, which offered a grant of public land to each State to be sold, the funds to serve as an endowment and thereby make possible the creation of educational institutions devoted to serving public need. The Act particularly stressed the teaching of agriculture and mechanical arts and more generally the promotion of "the liberal and practical education of the industrial classes in the several pursuits and professions of life." Although the Federal Government laid down certain broad policies, actual control of the new land-grant institutions was to be left to the States themselves and the States were to provide buildings and grounds and contribute to the maintenance of the institutions. The States responded to the offer and thus a new system of popular education was established.

The need for research as a continuing basis for education soon became apparent, and in 1887 the Congress provided for annual grants to support agricultural research at the new institutions. Additional acts were passed later to provide annual grants to support resident teaching. In 1914 the work of the institutions was further strengthened when the Congress passed the Smith-Lever Act, providing annual grants to the States for cooperative extension work in agriculture and home economics. This Act completed the three-sided pattern that continues to shape the work of the land-grant institutions—research, instruction, and extension.

The land-grant system has had a profound effect on the life of people of the United States, espe-

cially in rural areas. Today's system includes 69 institutions, varying in size from the University of Alaska with approximately 400 students, to the University of California with approximately 40,000 on several different campuses in widely separated locations. The land-grant institutions enroll annually more than 400,000 men and 120,000 women students. The system's 53 experiment stations are carrying out approximately 15,000 agricultural research projects, of which one-third are financed at least in part by Federal funds. The system includes more than 12,000 county extension agents and home demonstration agents. Approximately 30 million rural and village people benefit directly from the extension work in agriculture and home improvement. To facilitate the land-grant institution work, the Federal Government annually grants them approximately $5 million for resident teaching, $12.5 million for agricultural research, and $27.5 million for extension work. The institutions much more than match the total of these funds with monies from other sources. The States, local communities, and private sources contribute about an equal amount for extension, contribute four times that of the Federal appropriation for research, and contribute an overwhelming proportion of the funds for resident instruction.

This, then, is the great rural service organization that is one of the participants in programs of technical cooperation in agriculture. From the first, the organization has been zealously interested in such participation. President Truman, on January 20, 1949, delivered his inaugural address in which, as a fourth point, he called for sharing our scientific advances and industrial progress with other countries. Immediately, Dr. John A. Hannah of Michigan State College, then president of the Association of Land-Grant Colleges and Universities, responded with the following message:

"This is to offer the full cooperation of the members of the Association of Land-Grant Colleges and Universities in carrying out the fourth point of your inaugural address, which gave new inspiration to many of us who have long been convinced that such a program is basic to progress toward the stable, democratic, peaceful world which we all want. . . . As institutions and individuals, and collectively, the Land-Grant institutions and their staff will welcome an opportunity to do their part in realizing the program you have outlined."

The offer of the land-grant institutions was accepted and, today the institutions are participating in technical cooperation work by performing four basic functions.

Training Foreign Nationals. At the rate of about 3,000 persons a year, citizens of other countries are coming to the United States for special agricultural training, and most of the responsibility for assisting them is borne by the land-grant institutions. Also the doors of the institutions are open to hundreds of additional foreign students who come to follow regular curricula leading to degrees.

Training United States Technicians. The land-grant institutions, in training the future agricultural technicians of the United States, are in actuality giving competence to our future leaders of technical cooperation programs. Out of the half-million students at our land-grant colleges and universities will come the technical cooperation agricultural workers of tomorrow.

Lending Staff Members. The United States, in all of its technical cooperation programs, has several hundred agricultural specialists serving in other countries. Some of them are on direct loan from land-grant institutions; the great majority of them have at some time in their careers been staff members of land-grant institutions.

Taking Project Responsibility. Several of the land-grant colleges, through contractual arrangement, have assumed direct responsibility for carrying out technical cooperation projects. The first to undertake such work is the University of Arkansas, which is now cooperating with Panama in a program to develop that Republic's agricultural economy. Texas Agricultural and Mechanical College is developing a plan for cooperation with the University of Mexico to help improve agricultural education in Mexico. The University of Minnesota has undertaken a survey of agricultural research institutions in Latin America to facilitate the active exchange of publications between such institutions and those of the United States. New Mexico Agricultural and Mechanical College has recently presented an 8-week training course to selected Latin American delegates to acquaint them with typical extension and farm and home management services. Michigan State College is exploring plans for cooperation with the National University of Colombia. The University of North Carolina is providing biometric services to technical cooperation programs, thereby providing a better measure of the efficacy of our agricultural improvement efforts. Utah State Agricultural College is participating actively in the village improvement program in Iran by providing both program leadership and staff. Purdue University expects to assist the Rural University of the State of Minas Gerais, Brazil, in developing extension and home economics work. The

University of Wisconsin, long a keen observer of land tenure problems of the United States, is host this fall to representatives of about 40 foreign countries at a world conference on land tenure and related problems.

These are the land-grant institutions that are contractual participants in technical cooperation programs at the present time. Additional names will be added to the list in months to come, for the feeling is general that these institutions-of-the-people, because they are close to the agricultural problems of our own Nation, will also be particularly understanding of the agricultural needs of others.

We of the United States Department of Agriculture are coordinating closely with the land-grant institutions in these many and varied tasks. To facilitate coordination, together we have established a Joint USDA-Land-Grant College Committee on Agricultural Services to Foreign Areas. The Committee has seven representatives of the land-grant institutions and seven representatives of the Department of Agriculture. We meet periodically to review present programs and make plans for future cooperative activities. We are finding this association mutually satisfying and rewarding.

Unselfish public service is the guiding principle of our land-grant institutions. Traditionally, their advisory assistance is available to all people of the United States who will put it into use, from lowliest citizens to highest. It is particularly fitting, I believe, that our land-grant institutions be prominently identified with the technical cooperation programs that seek "to help people help themselves."

If you want maximum gains from grass-legume pastures you should (1) practice rotation grazing; (2) permit 3 to 4 weeks of regrowth between grazing periods; (3) divide grazing area into 6 or more paddocks so grass will be grazed down with minimum losses from trampling and fouling with manure.

—Meaty News

Is Your Farm Hungry?

Condensed from the Kansas Farmer

Dick Mann

OUR soil is the biggest digestive system in the world, say L. E. Willoughby and Gene Cleavinger, Kansas State College Extension agronomists. That is their way of bringing a complicated chemical process down to simplest terms.

It's like this, they say. When you eat food it is acted upon by acids and bacteria in the digestive system until it is reduced to a liquid that can be taken into the blood stream. If you starve your system of certain needed foods the body becomes undernourished and eventually may break down.

The same process goes on in the soil. Plant food is acted upon by bacteria and acids until it becomes soluble and can be absorbed by plants. When you starve your soil of certain needed food elements it becomes undernourished and will break down, just as will the human or animal body.

Perhaps this simple explanation will help you understand work now being done by Kansas State College in trying to correlate soil testing with fertilizer applications in co-operative test plots.

Soil tests are made of soil where test plots are to be set out. Using the results of these soil tests, co-operating farmers apply various combinations of fertilizers. These are compared to no-treatment plots to see whether the soil responds as indicated by soil tests.

While no general conclusions have been made, interesting results were obtained on some of the plots. These results were greatly affected by weather and other factors, but here are a few examples that show fairly good correlation between soil tests and fertilizer applications.

On the William Wohlgemuth farm, in Atchison county, the test showed soil was high in organic matter, low in phosphorus and high in potash. Four thousand pounds of lime an acre were required to offset acidity before fertilizer was applied.

Wheat with no fertilizer treatment made 21.9 bushels an acre. Yield was boosted 15.5 bushels, or up to 37.4 bushels an acre, with an application of a complete fertilizer.

When phosphorus was left out of the mixture the plot produced only one bushel an acre more

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Topeka, Kansas, January 19, 1952

than the untreated plot. When only nitrogen was left out the increase was 4 bushels an acre over the untreated plot.

Leaving out potash gave an increase of 11.2 bushels over the untreated plot. The soil test had shown that phosphorus was the chief limiting factor on production, with nitrogen secondary. fertilizer test confirmed the soil test. Similar results, with variations, of course, were reported on both wheat and oats tests over the eastern part of the state.

Soil tests, say Mr. Willoughby and Mr. Cleavinger, offer a means for evaluating the plant food content and acidity of the soil.

The physical condition of soil is an important factor in how well plant food in the soil is made available to crops. Using a good crop rotation (including a legume) and tilling soil at proper moisture content are the best ways of maintaining the soil's physical condition, say the Extension agronomists.

Plant foods are grouped into 3 classifications—primary foods, secondary foods, and minor foods.

The 3 primary foods are nitrogen, phosphorus and potash. Nitrogen gives dark green color to plants, promotes leaf, stem and fruit or seed growth, improves quality of leaf crops, produces rapid growth, increases protein content of food and feed crops, and feeds soil micro-organisms during their decomposition of low-nitrogen organic materials.

Phosphorus stimulates early root formation and growth, gives a rapid and vigorous start to plants, hastens maturity, stimulates blooming and aids in seed formation and gives winter hardiness to fall-seeded grains and hay crops.

Potash imparts increased vigor and disease resistance to plants, produces strong, stiff stalks (reducing lodging), increases plumpness of grain and seed, is essential to formation and transfer of starches, sugars and oils and imparts winter hardiness to legumes and other crops.

Secondary plant foods consist of calcium, magnesium and sulfur. Calcium promotes early root formation and growth, improves general plant vigor and stiffness of straw, influences the intake of other plant foods, neutralizes poisons produced in the plant, encourages grain and seed production, increases calcium content of food and feed crops.

Magnesium aids in maintaining dark green color of leaves, regulates uptake of other plant foods, acts as carrier of phosphoric acid in the plant, promotes formation of oils and fats, plays a part in the translocation of starch.

Sulfur gives increased root growth, helps maintain dark green color, promotes nodule formation

on legumes, stimulates seed production, encourages more vigorous plant growth.

Minor plant foods, sometimes called "trace elements," are boron, manganese, copper, zinc, iron and molybdenum. Although needed only in small quantities, all are necessary for plant growth.

It is only natural that farmers will spend more money for fertilizers in good crop and price years than in poor crop or lower price years.

Actually, failure to fertilize adequately during one season merely increases the need during the following season. So, if you fail to give your soil all the fertilizer it needs this year you may be cutting your current crop yields and increasing cost of feeding your soil next year.

To get the most efficient and profitable use of fertilizers, use these rules found in the bulletin "Our Land and Its Care":

1. Follow fertilizer recommendations of your State Experiment Station.

2. Remember fertilizers are used to supplement natural plant food supplies of the soil, and plant food obtained from farm manure and crop residues.

3. Consider requirements of your rotation as a whole, as well as plant food needs of the particular crop.

4. Remember fertilizers do not take the place of lime, organic matter, good seed, proper cultivation or good crop rotation.

5. Regard good soil structure or tilth as essential in obtaining the most efficient results from fertilization.

6. Select a fertilizer analysis containing plant foods your soil will not adequately supply for crops you want to grow.

7. Be sure plant food elements in your fertilizer are in the right proportion to fit the needs of your soil and crop rotation.

8. Use adequate quantities of recommended fertilizers to obtain profitable yields of high-quality crops.

9. Apply fertilizer at the right time and use an approved method of application for best results with each crop.

10. Bear in mind that fertilizers can be used most efficiently when you know the strong points and weaknesses of your soils, and can choose the fertilizer grade that fits your needs.

Line up machines for belt work. Less wear and greater power will be your reward. Machinery out of line is hard on belting and wears bearings unevenly.

Antibiotics for Pigs on Pasture

Condensed from The American Hampshire Herdsman

L. E. Hanson, E. F. Ferrin, and W. J. Aunan
University of Minnesota

THE role of antibiotics and vitamin B_{12} in rations for pigs on pasture has not received a great deal of attention as yet. Studies that have been reported indicate that green forage in the pasture stage is deficient in vitamin B_{12}. In most of the dry-lot studies reported, aureomycin additions to several types of rations have stimulated growth rate in pigs and in many cases have resulted in more efficient use of feed by the pigs. Vitamin B_{12} fortification of a corn-soybean oil meal type of diet has stimulated growth in all tests, and has resulted in more efficient gains.

The objectives in this experiment were as follows:

1. To determine whether a vitamin B_{12} and aureomycin supplement would improve a good ration, fed to pigs on excellent alfalfa-brome grass pasture.

2. To study the effect of the treatment on the carcass excellence of the pigs.

Procedure

The pigs used in this experiment were farrowed on concrete and kept there until weaning. During the suckling period they were fed a creep ration fortified with aureomycin and vitamin B_{12}. Most of the pigs used were started on test the day they were weaned. The remainder were from litters weaned at an earlier time. The latter pigs had been kept on concrete and fed a ration which included vitamin B_{12} and aureomycin fortification.

For the first 6 days of the experiment the pigs were kept on concrete, in the barn, so that they would forget their dams. During this interval, they were treated for worms (sodium fluoride treatment). The first trial was begun May 1 and the second May 8. In each trial the pigs were paired on the basis of litter, sex, and weight.

Alfalfa meal, at the rate of 20 per cent of the supplement was included in the first batch of feed mixed for each group (300 lbs.). This they consumed in about seven days. The pigs were moved to the pasture lots on the sixth day of the experiment. The feed mixture, self-fed until the pigs reached an average lot weight of

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approximately 75 lbs. was as follows:

Lots 1 and 3 (Controls)

200 lbs. ground yellow corn
46 lbs. soybean oil meal (expeller process)
20 lbs. tankage (dry rendered —60%)
10 lbs. linseed meal (old process—34%)
2 lbs. steamed bonemeal
2 lbs. iodized salt

Lots 2 and 4

The same as lots 1 and 3 plus 0.25 lb. Lederle's Aurofac per 100 lbs. of mixed feed.

After the pigs reached an average lot weight of 75 lbs. each they were self-fed shelled yellow corn and a supplement, free-choice. The basal supplement fed to lots 1 and 3 was composed of 57.5% soybean oil meal, 25% tankage, 12.5% linseed oil meal, and 2.5% each of steamed bonemeal and iodized salt. The pigs in lots 2 and 4 were fed the same supplement plus 1 lb. of Lederle's "Aurofac" per 100 lbs. of supplement.

The alfalfa-brome grass pasture was excellent throughout the experimental period. It was mowed once to keep the forage at a succulent stage of growth.

In both trials the addition of the aureomycin and B_{12} supplement (Aurofac) increased the daily feed consumption and the rate of gain. This occurred in the first period when the pigs were fed a mixed ration as well as in the feeding period, beyond 75 lbs., when the pigs were fed corn and supplement, free-choice. In trial 1 the feeding of the antibiotic B_{12} supplement did not result in more efficient gains during the first period, but there was some increase in efficiency when the pigs were fed free-choice. In Trial 2 the vitamin B_{12}-aureomycin supplement produced somewhat more efficient gains in both periods of the experiment (compare lot 4 with lot 3, Trial 2). For the total feeding period in Trial 1, the aureomycin-B_{12} fed pigs required 3.4% less feed per unit of gain than the controls. In Trial 2 the difference was 8.3%. If we consider them both, the saving in feed is not significant and it would hardly cover the cost of the aureomycin-B_{12} supplement.

However, the supplemented lots (2 and 4) reached 200 lbs. approximately 14 days ahead of their controls. This is the most important gain from the feeding of "Aurofac" in this experiment.

There was some scouring, for a few days, in the control lots. This stopped spontaneously. There was no scouring in either of the lots fed "Aurofac".

During the free-choice feeding period the pigs fed "Aurofac" consumed more corn in relation to supplement than the control

pigs. This was observed in both trials, though the difference was more pronounced in Trial 1. From 75 to 200 lbs. in weight the control pigs in Trial 1 ate 3.75 lbs. of corn to each pound of supplement; the pigs fed "Aurofac" ate 4.71 lbs. of corn to each pound of supplement. In Trial 2 the controls ate 4.34 lbs. of corn, and the "Aurofac"-fed pigs ate 4.44 lbs. of corn for each pound of supplement consumed.

1. The fortification of a good ration with an aureomycin and vitamin B_{12} supplement fed to pigs on excellent alfalfa-brome grass pasture, increased the daily feed consumption of the pigs and increased the daily rate of gain. It did not reduce the feed requirement per unit of gain, appreciably.

2. The pigs fed the antibiotic and B_{12} supplement reached 200 lbs. about 2 weeks earlier than their controls.

3. The pigs fed the antibiotic and B_{12} supplement consumed somewhat higher proportions of corn to supplement than the controls, when they were free-choice fed.

Calves Need Roughage

Condensed from The Farmer

SLOW gaining, rough looking dairy calves may be getting too much grain. Those getting excessive grain in proportion to roughage may also be short on beneficial digestive "bugs."

Recent work at the Ohio Agricultural Experiment Station has shown that calves raised apart from older animals, as is the case on many farms, fail to develop many of the typical rumen microorganisms needed to aid in digestion of roughage in the paunch.

The rumen, which for practical purposes is a fermentation vat, provides beneficial bacteria with a suitable home and a good place to work. In return, the bacteria pay rent by breaking down food eaten by the animals and by manufacturing high quality proteins and vitamins. But they need lots of hay and roughage on which to thrive and build up.

Calves penned apart from older animals have little opportunity to pick up these microscopic bacteria and protozoa through the usual methods of being licked by their mothers or eating feed mouthed over by older cattle. As a result, some of them become rough in appearance and fail to make normal growth gains when they reach the stage at which roughages make

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up a large proportion of the diet.

Such calves may need a "cud inoculation."

W. D. Pounden and J. W. Hibbs, using such a process, gave rough-coated, poor doing calves small pieces of cud material from older animals.

One four month old calf in a typical farm herd overcame an unthrifty, stunted condition soon after inoculation. "The inoculation had a visibly beneficial effect in overcoming the subnormal condition of this calf when comparison was made with those left untreated," they report.

Newborn calves were raised at "reasonably low costs and with a minimum of digestive disturbances" where rumen inoculations were coupled with high-roughage feeds after the colostrum feeding period.

T. W. Gullickson, in experiments with identical twins at the University of Minnesota, has also shown calves need little or no grain.

He found calves raised on "no-grain" rations not only made almost as rapid gains in weight as those getting grain—but did so at considerably less cost.

Gullickson saved nearly $5 in raising a calf to six months of age by feeding good quality legume hay and skim milk. He fed all calves whole milk for about two weeks, then skim milk (at the rate of 1 pound per 8 pounds body weight of the calf) until 180 days of age. All calves got good alfalfa hay and one twin in each set also got a grain mixture.

The grain-fed calves gained 1.77 pounds a day and ate $24.04 worth of feed in six months. The no-grain calves gained 1.61 pounds a day at a total feed cost of $19.31.

To get the bacteria into the rumen of the calves, Pounden and Hibbs took cuds from the mouths of healthy cows in the herd while they were chewing. A small piece of this cud material was placed in the back of the calf's mouth on about the 7th, 14th, 21st and 28th days of age. One cud was enough for several calves, but a fresh one was obtained each day, as needed.

Bright green, leafy alfalfa or alfalfa-timothy was before the calves from about the first week. Beneficial bacteria were found to multiply readily when plenty of high quality roughage was in the rumen, but became very scarce and sometimes disappeared when too much grain was eaten in proportion to the roughage.

In the first experiments, grain was fed only after the calf was eating about a pound of hay per day. Even as hay consumption increased, the grain ration made up no more than one-fourth to one-half the total amount, by weight, of hay consumed. In more recent work, hay was ground coarsely and grain mixed with it.

Give Calves a Good Start

Dairy calves are valuable, both as herd replacements and for direct sale. Here are recommendations of successful dairymen for giving them a good start in life:

Raise calves separately. Provide a pen for each until one week after milk or milk substitute feed is discontinued.

Give each calf a pen at least 24 feet square in size.

Keep plenty of clean, fresh water before them. Don't let it become ice-cold.

Make feed boxes big enough for calves to use; removable for easy cleaning.

Build solid partitions between individual calf pens to reduce drafts. Fronts of pens should be slatted.

Avoid sudden variations in temperature. Desirable pen temperature range is from 50 to 75 degrees.

Feed high quality hay from the start. Guard against poor quality of much of this year's hay. Silage may be fed after calves are six months' old.

More Corn on Less Land

Reprinted from Capper's Farmer

Dr. George D. Scarseth

CORN is so valuable as a source of cash to farmers that we are letting it hurt our lands.

Practices used to grow most of the corn on about 85 million acres in the U. S. A. are such, with some bright and encouraging exceptions, that the land is gradually losing its organic matter and is slowly and surely being badly hurt and even destroyed by erosion. This is true even with current yield trends up.

Another sad angle is that most cornfields could produce from 30 to 50 bushels more corn an acre than they now are doing. These extra bushels would be cheaper than the first 30 to 80 bushels made on an acre with the practices now generally followed.

These sound like brave words in the face of the progress made in the average cornfield these last

Reprinted by permission from Capper's Farmer
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10 years, but not in the face of research facts and experience of a few leading farmers.

In 1951 we produced about 2.9 billion bushels on some 85 million acres. This is at an average yield of 36 bushels an acre. If this was increased by only 9 extra bushels an acre we would have nearly 800,000,000 more bushels on the same acres and a national crop of about 3.7 billion bushels.

If we estimate that these extra bushels cost as much as 70 cents each, the PMA price of $1.55 would leave a net of 85 cents a bushel, or a national saving of $680,000,000—a real gain in cash to farmers and more stover residue for the land. This is a real economy that seems worth working towards.

It is unrealistic to hope to increase the production on 85 million acres by 9 bushels each; therefore, let's look at what it would take to make these 800 million extra bushels on just one fourth of the nation's corn land. This means that 36 more bushels an acre would have to be made on one fourth of the total corn acreage in the nation. Thus the fields now producing 70 bushels should make 106; a 90-bushel field should be pushed to 126, or a 50-bushel field should produce 86, on the average of about 21 million acres. These 36 extra bushels are just an example. Dr. B. A. Krantz in North Carolina at the college experiment station, obtained as much as 100 bushels an acre increase with adequate fertilization over prevailing old practices that produced only 19 bushels an acre.

These extra bushels would be the most profitable corn too, because they would be made largely within the fixed overhead charges farmers have anyhow. The only cost would be for the extra fertilizer, labor of applying it and harvesting. How can this be? By the use of adequate stands and correct amounts of plant food on top of all the other practices we now use.

We have tended to blame the low national corn average yields on the South. We can't do this since in 1950 Virginia farmers averaged 49 bushels an acre, which beat Iowa farmers, whose average was only 47 bushels an acre. We can't blame weather either for being too wet or too dry. Let us look at the opportunities we have to make more net cash by using new knowledge that we did not have as recently as only 12 years ago.

Here are things we need to do to make that 36 extra bushels without hurting the land and at more profit:

1. Stop mineral starvation in the soil-building legumes grown for corn. Add enough dolomitic (calcium magnesium) limestone, and phosphate and potash to feed richly and not just half-feed these

crops. Be guided by soil and plant tissue tests.

2. Stop nitrogen starvation in the cornfields. The lack of organic matter in the soils to supply enough nitrogen is very costly.

Add about 2 extra pounds of nitrogen for each extra bushel of corn. Thus for 36 extra bushels use about 72 extra pounds of nitrogen. Some farmers have used 120 pounds of extra nitrogen an acre with profit. Use extra phosphate and potash as in 10-10-10 if these are not adequately applied earlier in the rotation. An unbalance in nutrition is costly. Deep placement as on the furrow, or plowed under before planting or side-dressed between the rows at about lay-by-time looks good, but don't forget to use a couple of hundred pounds of row starter as 5-20-20 or 10-10-10.

3. Thicken the stand to get more corn. We have learned to plant corn thin to fit the thinning land. Two to 3 stalks a hill was OK when I was a boy. This is about 9,000 stalks an acre. One can't make any extra bushels by heavily fertilizing such a stand. The very best growers and experiments have gone to 15,000 and even 20,000 stalks an acre with big increases in yield when heavily fertilized. The two go together. Thicken the stand and increase the plant food supply, especially nitrogen where the phosphate, potash and lime have been used as they should be in front of the legumes.

4. Thicken stand to get more organic matter. Seven thousand stalks are added in thickening a stand from 10,000 to 17,000 stalks an acre. These extra stalks demand more nutrition—phosphate, potash and especially nitrogen. To thicken stands without extra feeding is not done generally, because farmers have observed a firing of the leaves. Extra nitrogen will cure this; the amount extra varies from 50 to 100 pounds nitrogen an acre.

Nitrogen starved stover at ripening time may contain only 0.4 per cent nitrogen (2.5 per cent protein) but if adequately supplied with nitrogen in a balanced nutrition with phosphate and potash, may contain as much as 1.0 per cent nitrogen (6.25 per cent protein). Thus to increase the stover yield from about 2,000 pounds to about 6,000 pounds an acre with twice the nitrogen content in the heavier stover, is a real factor as a soil builder for succeeding crops. This would be equal to cutting the carbon-nitrogen ratio of the stover in half and having 2 to 3 times as much organic matter to return to the soil.

5. Don't overcultivate and cut corn roots. We need more research on cultivation. Can we cultivate less and put up with a few more weeds by supplying some extra nitrogen to feed the extra weeds?

After all, weeds do act as a cover crop and supply organic matter. By knocking them down with sweeps, even if they are not killed, they provide some mulching effect.

From personal observation it may take about 50 extra pounds of nitrogen an acre to keep the weeds from robbing the corn. The well-fed corn soon shades out the weeds that were somewhat held back by light and early cultivation.

6. Grow the corn you need on fewer acres. Corn is a carbohydrate producer. It is valuable in a livestock agriculture. But proteins are also needed by livestock. It argues as good sense to balance the corn production with more high protein forages. Profitable corn grown so as not to hurt the land and at the most net profit along with better mineralized high protein legumes as a basis for a livestock economy, seems like a tempting challenge.

New Farm Chemicals

Condensed from The Ohio Farmer

Delmer E. Groves

THE increased use of chemicals, coupled with better farming methods, has doubled and even trebled the yields and quality of farm products. Without chemicals we could have produced and saved only part of the 1951 bumper crops.

We are all familiar with the chemicals used in fertilizers. But those needed to control insects and diseases present a different picture. A farmer almost needs to carry a chemistry notebook with him when he goes to town to buy supplies. The following list of farm chemicals, compiled by experiment station and industry scientists, will help identify some of those in common use.

DDT. This is the best known of the newer chemicals. It has a wide number of uses and can be mixed with other insecticides. DDT controls leaf-hoppers, flea beetles, Colorado potato beetles, blister beetles, cucumber beetles, squash bugs, plant bugs, pickle worms, thrips, European corn borer, corn earworm, Japanese beetle, white grubs, codling moth, grape berry moth, Oriental fruit moth, tomato fruitworm and pinworm, sowbugs and peach tree borer; also body lice, fleas, bedbugs, flies and mosquitoes.

This chemical builds up in the body and therefore should not be applied to plants or plant parts which will find their way into food

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channels within 30 days. Nor should it be used on milk cows or on animals to be slaughtered within 30 days.

As is the case with all insecticides, it is best to rely on the directions of the manufacturer for dosage and use. Don't waste money in buying materials of unknown concentrations or strength.

Methoxychlor. This has much the same use as DDT. It is not harmful for it does not build up in the body. Thus, it can be used in place of DDT on dairy and beef animals. It takes larger doses to get the same kill of insects as DDT. Methoxychlor is preferred over DDT on such sensitive plants as cucurbits and tomato seedlings.

Rhothane (DDD or TDE). This material has been used effectively against the red-banded leaf roller. Use of DDT seems to have killed the natural enemies of the leaf roller and often makes the use of Rhothane necessary. It will mix with other pesticides.

Benzine hexachloride. Commonly called BHC, this compound is easily recognized by its heavy, musky odor. It is used for external pests of cattle and hogs but its main claim to fame lies in the control of spittlebug. Demand for this purpose has been so great that the supply is scarcely adequate. It can also be used for plum curculio control.

Although very volatile, BHC leaves its musty flavor and should not be used on dairy animals, root crops, and most fruits and vegetables. The material should not be mixed with lime, calcium, lead arsenate or fixed coppers.

Lindane. This is just BHC with the smell taken out by refining which allows it to be used in dairy barns for fly control and on strawberries to control spittlebugs. Naturally it is more expensive than the BHC from which it is made.

Chlordane. Like BHC, this compound cannot be mixed with lime or other alkaline chemicals. It can be mixed with neutral or acid chemicals. Chlordane has become wellknown the past few years as the chemical that kills grasshoppers. It is also effective against cockroaches, ants, bedbugs, sucking lice, house flies, root maggots, stable flies, Japanese beetle larvae, mosquitos, plum curculio, silverfish and white grubs.

Chlordane is toxic and must be treated with care. The skin should be protected when using the chemical. Keep the material away from food and food containers when using the chemical in the home. Do not use chlordane for treating animals.

Aldrin. This material can be used freely with most other agricultural chemicals. It is more toxic than chlordane and enters the body readily through the skin. Highly effective in the control of

grasshoppers, it will also control ants and soil insects such as white grubs and grubs of the Japanese beetle. Aldrin should not be applied to food crops.

Dieldrin. Its use is similar to aldrin but its effect will last longer. This is because it has greater penetration than aldrin and this fact makes it even more dangerous to use. It should not be used on food crops or on crops for animal feed. Dieldrin will mix with most agricultural chemicals.

Toxaphene. This material is valuable to kill grasshoppers on legume seed crops since its toxicity to honeybees is less than that of dieldrin, aldrin or chlordane. It also controls spittlebug nymphs, cutworms, webworms and armyworms. This material can be mixed with other organic insecticides. Injurious to many garden crops, it also may give tobacco an off-flavor. The toxicity is high.

HETP and TEPP. Both compounds contain phosphorus and thus are poisonous. They corrode metal containers and can be mixed with sulfur and some of the newer chemicals. Main use is on 17-year locusts or cicada, and also for the control of mites and aphids. These compounds will burn tender foliage unless used in very dilute form.

Parathion. Another phosphorus compound, this is highly toxic to humans. A respirator and protective clothing should be worn when spraying and dusting with this chemical. It will mix with some of the other organics, sulfur and neutral copper.

This material is very useful against aphids, mites, scale insects, greenhouse insects and many other pests. Its unpleasant odor (like garlic) and high toxicity limit its use on household insects and domestic animals. It can be used safely on edible produce if applied three weeks before harvest.

EPN. This material was developed as a miticide and is very effective against a wide range of leaf-feeding mites. An organic phosphorus, it is also useful against corn borer, plum curculio, Oriental fruit moth, onion thrips and red-banded leaf roller. Less toxic than the other phosphorus compounds mentioned, it is still dangerous.

Systemics. This type of organic chemical is intended to give control for a longer time after treatment. These poisons are absorbed into the plant's system. Thus they control piercing-sucking insects and mites. Systox and Pestox, available commercially, have been tested at one of the experiment stations. This is a new development and the station scientists are not ready to recommend these chemicals for general use.

Profitable Factors for Corn Production

Not often do you find a publication giving the dollar and cents value of following good practices in the production of a crop. Recently, however, Dr. John H. Bondurant and Keith R. Vice of the Kentucky Agricultural Experiment Station have written a bulletin titled, "Profitable Factors for Corn Production in Kentucky."

This bulletin summarizes a great deal of data collected from many experiments. Some of the most recent and most interesting data come from field experiments conducted by the Farm Economics Department staff to get first hand information on what returns can be expected from fertilizer applied to corn. Furthermore, the staff members were looking for answers to specific questions: How much fertilizer will pay on corn? Can the low yielding corn acreage be made to produce corn profitably by the use of fertilizer? How does stand effect the economics of using fertilizer on corn? What about hybrid seed corn, contour cultivation and cover crops?

Fertilization: Higher rates of fertilization than commonly practiced on typical corn producing farms were generally profitable. On land suitable for corn, but low in productivity, it was profitable to fertilize enough to more than double corn yields. This meant that it was profitable in most cases to use 1250 pounds of 8-8-8 fertilizer per acre. Returns per dollar spent for fertilizer did not begin to diminish until yields of 80 to 90 bushels were reached.

Rate of Planting: Varying the number of plants with the fertility level achieved the highest net return. With high fertility 12,000 stalks per acre was the best planting rate.

Hybrid Seed Corn: Adapted hybrid seed increased yields approximately 20 per cent over that from open-pollinated varieties. The returns per dollar spent for seed were about 10 to 1.

Contouring: Contour planting and cultivating of corn on sloping land increased the value of corn produced by about 10 per cent for farms producing relatively high yields per acre.

Winter Cover Crops: Winter cover crops increased yields when plowed under preceding the corn crop. On relatively high producing upland and creek bottom fields the average increase was 13 bushels per acre.

—From Nitrogen News and Views

Lowering Beef Cattle Production Costs

Condensed from the Shorthorn World

Paul F. Newell
State College, Mississippi

PASTURE and forage crops are basic livestock feeds. Their utilization is a significant phase of an expanding livestock program. Cattle, sheep and hog producers who utilize these crops as feeds will influence the choice of combinations employed in order to have crops that will produce the most beef or other animal product on a given land. These pasture acreages are of prime importance to the cattleman because the cattle business requires extensive grazing.

Pasture and forage production and utilization plans for any area must be broad but objective, because soil types are variable and costs must be kept in line with what consumers can and will pay for the products of grazing. Pasture and feed utilization must conform to practical livestock production and management systems which are often different on adjoining farms. Cattle feed in the Southeast is largely grass and roughage. Here pasture is of first importance and much more of it is needed to support the fast growing cattle industry.

Some areas to be used for new feed sources require drainage, brush clearing, leveling, seeding, fertilizing, fencing, water supply, and certain livestock equipment, all of which will give the land a higher value. Such improvement work calls for broad technical knowledge in the various fields of soil, crop and livestock management.

In this period of expansion, it is important that cattle production methods be evaluated carefully. Equitable net returns must be shown. Improvements on pasture or range always include practices that add to the intrinsic value of the land and result in a higher land evaluation. Those improvements of a lasting nature are hardly chargeable against a calf crop for one, two, three or four years. Long-time improvements which add to the value of land are properly reflected in higher land values because the land becomes more productive. Range improvement costs, properly prorated, are chargeable against a calf crop.

Even so, the average cattle pro-

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ducer cannot afford to invest too heavily in a program of land restoration because when excessive investments are made in reclamation practices they do not always result in correspondingly increased productivity, though these areas are used for grass or feed production. Good lands being cleared and drained are likely to prove more profitable in pasture than some gullied areas in the process of being restored. Such restoration, of course, is desirable but the costs often are too high to be afforded by an individual operator.

Livestock equipment such as fences, sheds, or corrals have a long period of service; also, many perennial pasture combinations should become longtime investments, making it possible to prorate costs over a period of years; too, certain minerals which do not require frequent applications can be prorated over the useful years. The cost of any practice is logically chargeable against the enterprize during the effective period. This fact alone places emphasis on permanent types of pastures because labor and seeding and land preparation costs are thus held to a practical minimum.

These and current operation costs point to the necessity of the average operator making his improvements gradually; also, to the need for long-term credit which must be used wisely.

Three to four acres of improved pasture are required in this general area to support a beef cow and her calf on an annual basis.

These productive pastures include a winter-spring combination like fescue and Ladino and another summer-fall combination like Dallis and lespedeza in the ratio of one acre of fescue and Ladino to two or three of Dallis and lespedeza. One acre of sericea might replace the third acre of Dallis and lespedeza. A Dallis, Bermuda, white clover combination has excellent value in the spring, summer and fall.

The question of capital investment required in improved pasture for a cow in this general area often is raised. Under present land and cattle values, it may be estimated that $225 to $325 will be needed. This figure is considerably lower than for other major cattle producing areas. It represents capital investment on which an interest return would be expected.

With this approach, the cattleman may appraise costs and returns and arrive at a fair estimate of the cost and net return in producing cattle. Cattle employed for breeding purposes, like land, are a part of the capital resources.

To know what it costs to produce a calf, the cattleman must determine the investment he has in his cattle and the land he devotes to them. Against these he charges a fair rate of interest. The

taxes on the land and the cattle must be figured and a fair rate of depreciation allowed on the herd, fences, corrals, cattle sheds, creep and self feeders, and machinery employed in the cattle operation. Veterinary supplies and fees, the cost of bull service, and labor and management costs must be added. Finally, the cost of the winter feed bill on the cow herd is figured in as one of the larger items. When all are totaled and the overhead cost of his annual herd production has been determined, the average charge per cow is obtained by simple division. All cows do not produce calves. Therefore, the average cost of a calf is found by dividing the cost per cow by the percentage of calves raised. Cattlemen who follow recommended practices estimate that costs of producing a calf range from 50 to 90 dollars. The better producers figure that the average value of calves sold from their herds ranges from 125 to 175 dollars. The estimates are not averages but represent calculations made by producers who follow practical methods of production, and who obtain satisfactory returns on their investment in cattle and land devoted to the cattle enterprise.

This analysis demonstrates the close relationship between land and cattle. The successful management of cattle is predicated on the use of considerable land. Extensive acreage is necessary from the standpoint of adequate pasture production and management as related to parasite and disease control. The crowding of cattle results in a short grass supply on which cattle will fail to maintain their weight—will not gain. Under such conditions younger cattle become susceptible to parasites and to certain diseases.

Good management, which includes the allotment of three to four acres of good land to each brood cow maintained, will eliminate bad situations and will result in the production of adequate feed essential to profitable production. These principles are fundamental. They should be understood more generally by many people who have to do with farming.

Since 1940, corn crops in the United States have exceeded 3 million bushels six times. Previous to 1940, this figure was reached only once (1920).

A Ground Cover for Sandy Soils

Condensed from Soil Conservation

R. Y. Bailey
Soil Conservation Service, South Carolina

We have a lot of land in both the Atlantic and Gulf Coastal Plains that is too sandy for most pasture grasses. Recent developments in the use of Pensacola Bahiagrass and reseeding crimson clover show that much of this poor land is good, if we use it right.

We learned several years ago that Pensacola Bahiagrass would survive on poor sandy soils. The forage was good for spring grazing, but got coarse and tough later in the summer. As Oscar Hurst, a farmer in Florida, expressed it, Pensacola Bahia was a yellow grass. This farmer learned after applying nitrogen fertilizer that Pensacola Bahia was a *green* grass. Our problem then was to supply enough nitrogen to make this a green grass.

Reseeding crimson clover sown on Pensacola Bahiagrass sod at Soil Conservation Service nurseries at Americus, Ga., and Thorsby, Ala., made good late winter and spring growth. After clover seed ripened in the spring, the grass made vigorous growth. The grass was green and succulent and the green color remained into the fall.

Clover came back to thick stands in the fall, if grass tops were mowed and removed for hay. Where very dense grass was mowed and left on the ground, clover came up only in narrow strips where the divider board on the mowing machine pushed the grass aside and exposed the soil surface. This was useful information to guide us in the management of a Bahia-crimson clover combination under farm conditions.

While we were learning from plantings of clover on Bahiagrass at the nurseries, farmers were making plantings of their own. Russell O'Barr, work unit conservationist in the Yellow River Soil Conservation District, Crestview, Fla., got some farmers to plant reseeding crimson clover on Bahiagrass. C. F. Manning called on O'Barr for help in planning the use of some cut-over pine land. In the early summer of 1949, the scattered pine trees, gallberry bushes, and other woody growth were cleared off and a seedbed

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prepared. Early in the fall, Manning sowed a mixture of Pensacola Bahiagrass and reseeding crimson clover. The land was limed and fertilized. Crimson clover furnished late winter and early spring grazing in 1950. Cattle were removed in the spring and a crop of clover seed was harvested. Following the clover-seed crop, Bahiagrass made a good seed crop. After harvesting seed, Manning pastured the grass. He did not have enough cattle to keep the grass grazed closely and it had a heavy top growth by fall. This top growth was mowed and removed for hay. A thick volunteer stand of clover came in the fall.

Several other farmers in this district tried some of the Bahia-crimson clover combination. G. C. Johnson, Baker, Fla., sowed Pensacola Bahiagrass seed in the spring of 1947. He sowed reseeding crimson clover seed on the surface, without covering, in late October 1947. He pastured both clover and grass in 1948 and each year since. His dairy cows take the grass tops off closely enough in summer for good stands of clover to come in the fall. He got thick stands of volunteer clover in 1948, 1949, and 1950. The clover residue left on the land each spring made his summer grass deep green in color. His dairy cows grazed the Bahiagrass right on through the summer. Johnson has not harrowed the soil since the initial planting in the spring of 1947.

A few farmers sowed Pensacola Bahiagrass seed immediately after it was harvested. Good stands resulted. This method saved cleaning, drying, and other processing of the grass seed. Up until the fall of 1950 when a late November freeze killed seedling plants, it appeared that seed of this grass could be sown almost any time. Seedlings that came up after early fall plantings survived the winters in other years. We don't know how often we may expect winter injury to seedlings. Our experience over the past several years indicates that spring, early summer, and late fall will be the safest seeding dates. Seedlings from spring plantings survived every year. Summer and early fall seedlings were thinned by cold in 1950. Seed planted in late fall did not germinate until the following spring.

The Pensacola Bahia-reseeding crimson clover combination grew well on a varietly of sandy soils. Soil conditions ranged all the way from the very best Class I sandy loams to deep, poor sandy soils. Best growth was on the better soils, but we learned that with proper treatment the poorer soils will grow these plants.

We believe this grass-clover combination has a useful place in a Coastal Plain grazing program. It is particularly promising for the deeper, poorer sandy soils. Graz-

ing results at Tifton, Ga., indicate that Coastal Bermuda is a better pasture grass than Pensacola Bahia for sandy loams and other more productive pasture soils in the Coastal Plain areas. It is the policy of operations personnel in the Soil Conservation Service to recommend Pensacola Bahiagrass for pasture on soils that are not well adapted to Coastal Bermuda. We need more exact information about the relative value of these two sandy-land grasses under exactly comparable conditions. Studies that are now in progress at Tifton should give us this information.

What about soil treatment? Farmers who are most successful with this plant combination have one thing in common—they fertilize liberally and regularly. They apply 500 to 1,000 pounds per acre of a complete fertilizer at planting time. This application of complete fertilizer is particularly important on the poorer soils. A little nitrogen is beneficial to the first-year clover seedlings. They maintain the vigor of volunteer stands with annual applications of 0-14-10, 0-12-12, or similar fertilizers, at rates of 500 pounds, or more, per acre each year. Most farmers apply ground limestone at a rate of about a ton per acre once every 4 or 5 years. They usually apply a little borax with their fertilizer.

This grass-legume combination has good possibilities as a protective sod in crop rotations on sandy soils. The sod gives perfect surface protection and the coarse roots and stems of Bahiagrass fill sandy soils with a durable type of organic matter. The green clover, of course, adds a succulent type of leguminous material to enrich sandy soils.

We have plowed several areas of Pensacola Bahia sod at the Americus, Ga., and Thorsby, Ala., nurseries. We learned from these areas that the grass sod should be turned in the summer or early fall in advance of planting the land to a cultivated crop in the spring. Where sod was broken and disked in the summer or early fall, most of the grass was killed. Summer or early fall breaking of the sod also allowed us to grow lupine or some other winter legume for spring green manure. Caley-peas and vetch volunteered after sod was broken at Thorsby. Crimson clover should volunteer in the fall after grass sod is plowed in the summer, but we have not tried it as yet.

Where we left the sod until spring, we were unable to kill the Bahiagrass and it interfered seriously with the cultivation of the summer crop. Seedling grass plants that came up during the spring and summer were not troublesome. We are quite sure from our experience that Bahia

will not be a pest on cropland, once the sod is killed.

The effect of plowing under a heavy sod of Bahiagrass was noticeable into the second year of cultivation. Partially decayed grass stems were still present in the fall of the second row-crop year. Growth of corn, grain sorghum, and winter legumes was noticeably better following a stand of Bahiagrass, Caley-peas, and vetch than it was where legumes alone were turned under. The combination of coarse grass and succulent legumes appeared to give us better results than either plant grown alone.

Bahiagrass-crimson clover combinations are being studied in our research program. We want more information about getting stands of Pensacola Bahiagrass by both fall and spring seedings. We want to know whether or not farmers can depend on the grass to come up to thick stands when seeded at normal rates at the last cultivation of cotton or corn. We want to know whether it will be safe practice to sow Pensacola Bahiagrass and reseeding crimson clover together in late October or early November following the harvesting of peanuts.

We need additional information about the management of this sod in rotations. A few farmers already have this sod on considerable acreages of their better cropland. Most of them will want to plow these fields and cultivate the land for cotton, corn, or peanuts. They will want to plant grass and clover on the other land. We want to get the information about the use of this sod in rotations by the time farmers need it.

Fuels for Farm Tractors

Condensed from the Agricultural Situation

Albert P. Brodell and Paul E. Strickler
Bureau of Agricultural Economics

THIRTY years ago farmers were little concerned with the source of energy with which to power their field machines. They worked their crops largely with horses and mules and relied on their own fields and pastures for feed. Now that tractors have replaced animal power, farmers are dependent on someone else for steady supplies of the necessary fuels to power their machines.

With the increase in mechanization the farmer has become largely dependent on petroleum products as fuel for his power machines. Today's farmer is directly concerned with the output of oil and gas wells, with refineries, and

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with transportation facilities such as railroads, pipelines and motor trucks.

Farm tractors alone used about 4 billion gallons of various petroleum fuels in 1951. This is 16 times as much motor fuel as was used by farm tractors in 1920.

The modern tractor is used more hours per year than its predecessor, because each year finds more machines and more attachments adapted for use with tractor power.

Extensive changes have taken place during the past 30 years in the kind of fuel used by tractors. The tractors of 1920 had low compression motors and many were designed to utilize low-octane fuels such as kerosene. Then gasoline accounted for only 40 per cent of the tractor fuel. Nation-wide studies show that about 70 per cent of the tractor fuel of 1940 was gasoline. By 1947 the proportion had grown to 80 per cent. This trend toward the increased use of gasoline has taken place even though the Diesel tractor appeared on farms after 1920. A considerable number of crawlers and some of the large size wheel tractors now have Diesel motors. By 1947, however, only 4 per cent of the fuel of farm tractors was Diesel fuel.

There are important reasons why farmers have increased their use of gasoline as a tractor fuel. With gasoline, there is less oil dilution, it is cleaner burning than the heavier fuels and even more important, it is easier to start the motor with gasoline than with low-octane fuels, especially in cold weather. This is especially important nowadays when many farmers use their tractors throughout the year. Less oil dilution means fewer oil changes, and cleaner burning motor fuels mean less frequent servicing of the motor. These save money and thus many farmers believe that the advantages of using higher-octane fuels more than compensate for their extra cost.

Developments of recent years indicate that the trend toward higher-octane tractor fuels may be accelerated in the years ahead. Ordinary gasoline has an octane rating of around 72, but LP-gases have substantially higher octane ratings. For butane the octane rating is about 93, and it is more than 100 for propane. These products are designated as liquefied petroleum gases because at normal temperatures and pressures they are in a gaseous state. These fuels must be transported and stored under pressure.

At atmospheric pressure, butane is a gas at temperatures of 32° F. and above, and propane at 44° below zero and above. Propane is more used than butane in the North, as butane would not vaporize at normal winter temperatures in these colder areas.

The LP-gases consist largely of propane and butane and propane-butane mixtures. Their use on farms is becoming widespread. More than one-fifth of the farms of the Nation used these gases in one or more ways in 1949, according to a Nation-wide study.

In many areas the LP-gases are sold in bulk, i. e., by the gallon. In other areas, they are sold by the pound and are usually known as bottle gas or cylinder gas. In the bulk areas farmers usually buy the LP-gases as butane or propane.

In many bulk areas, the cost per gallon of LP-gas is often below the cost of gasoline. On the other hand, the cost of LP-gas in areas where it has to be purchased by the pound is now much higher than gasoline. But bulk deliveries are spreading and may soon cover most of the country.

LP-gases have been used as a tractor fuel for 15 or more years. It has been only recently, however, that there have been developments which indicate that they may become important tractor fuels. Manufacturers now produce conversion units which can be adapted to tractors designed for using gasoline and other fuels. Also several of the larger manufacturers of farm tractors now offer for sale tractors that are especially designed for using the LP-gases.

The cost of the conversion unit varies widely, ranging from about $100 to about $300 each, depending on the type of unit. The low-price unit involves largely a change in the storage tank, new connections, and changes in the carburetion system. With the more expensive types the compression ratio of the motor is increased, a cold manifold installed, and cold spark plugs replace the regular spark plugs. These are in addition to the changes for the low-price unit.

The compression ratio can be changed either by installing a new cylinder head or with high-altitude pistons. Increasing the compression ratio of the motor increases its power and the extra power may be more than the component parts of the tractor can withstand. Before changing the compression ratio the approval of the manufacturer of the tractor should be obtained.

Trade sources indicate that there are now about 100,000 of these "changed-over" tractors on farms. Most of the conversion units were bought in the last 2 years.

With converted tractors, consumption of LP-gas for the same work may average around 20 percent above the quantity that would be required with gasoline or lower-octane fuel. Thus to be attractive LP-gas should be somewhat below the cost of gasoline in order to pay for the conversion cost and to defray extra costs that

might be required for storage tanks. Areas close to the source of supply are most likely to have a price advantage over competing fuels.

There are several important advantages in using LP-gas as a tractor fuel. It is the cleanest burning tractor fuel thus far available. There is less motor wear and the period between overhauls is lengthened. Oil dilution is substantially less than with gasoline and oil changes can be less frequent.

Another important advantage is that the LP-gases, especially propane, are expected to be in relatively large supply in the years ahead. Considerable quantities of propane are not now utilized and large market supplies are available. Should a critical situation develop gasoline might well be in short supply. Then an increased use of the LP-gas as a fuel for tractors for stationary and mounted motors and for other uses could be highly desirable.

Grazing Calendar

This grazing calendar is suggested by Professor R. R. Davis in a recent issue of Ohio Farm and Home Research. It is also adapted to most areas of the Corn Belt and a large portion of the country. Variations in the weather make it impossible to have a grazing schedule that will work every year, particularly on each end of a long grazing season. If an average year is considered, the following schedule should be possible.

April: Graze rye or rank wheat (only on light, well drained soil); nitrogen-fertilized bluegrass; or ladino-orchardgrass.

May and June: Graze improved bluegrass; meadow mixtures (ladino-orchardgrass, alfalfa-ladino-timothy; ladino-brome; or similar mixtures); harvest excess forage for hay or silage.

July and August: Graze meadow aftermath; birdsfoot trefoil-bluegrass.

September: Graze bluegrass; mixtures containing ladino clover and birdsfoot trefoil.

October: Graze bluegrass; meadows to be plowed.

November: Graze bluegrass; rye (only on light, well drained soils).

—Meaty News

Improving Dairy Herds by Sampling Bulls

Condensed from Farm Research

C. R. Henderson and R. S. Dunbar
Cornell University

RESEARCH in the Department of Animal Husbandry at Cornell indicates that a breeding program based on preliminary sampling tests of bulls used in artificial breeding offers unusual opportunities for improving dairy cattle. Analysis of production records* of more than 5,000 artificially sired cows has led to the conclusion that the best way to make sure that a bull is good enough to be used extensively in artificial breeding is first to "sample" him.

The study reported here was designed to explore the possibilities of, and best methods for, improving dairy cattle by selecting bulls from sampling tests. The specific questions to be answered were (1) how many bulls should be sampled per sire needed, (2) how many daughters per bull should be tested.

It is logical to suppose that the more tested daughters there are out of each bull, the more accurately can these bulls be ranked. But this means, too, that fewer bulls can be tested and consequently the chance of finding a truly outstanding sire is lessened. The data support these suppositions. The most effective selection program is that which best balances number of bulls tested against number of daughters tested per bull. Let us consider first how accuracy of prediction of future performance is related to number of progeny in a preliminary test. It was found that the correlation between progeny average on the preliminary test and the average of 100 later progeny is $.864\sqrt{(n/n+34)}$, where n is the number of progeny in the preliminary test. Table 1 presents a

TABLE 1

Number of progeny per bull in preliminary test	Correlation between preliminary test and next 100 progeny
5	0.31
10	0.41
20	0.53
50	0.67
100	0.75
200	0.80

* Records furnished by New York D.H.I.A. Financial support was given by the New York Artificial Breeders' Co-operative, Inc.

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January, 1952

few selected values to illustrate how accuracy of prediction increases with increasing numbers of progeny. If one program involves testing 20 daughters each from 10 bulls and a second the testing of 50 daughters each from 10 bulls, and if 4 bulls are selected on the basis of the test, the second program will result in the selected bulls having daughters $(.67 - .53) \div .53 = 26\%$ farther above the average of their breed than would the first program. However, if 50 rather than 20 daughters per bull are tested, fewer bulls can be sampled. We need, therefore, to consider next the influence of number of bulls tested on the progeny performance of the selected bulls. In Table 2 is shown the average superiority in production of future progeny when varying percentages of bulls, each with 20 tested daughters, are selected. For example, suppose that 2 bulls are needed. If 4 are tested by 20 progeny each, the future daughters of the 2 bulls selected are expected to produce 7.0 pounds above average (the entry in Table 2 corresponding to 50% selected). But if 20 are tested, the future progeny of the 2 bulls selected are expected to be 16.1 pounds above average (the entry in Table 2 corresponding to 10% selected). It is clear from this table that much is gained by selecting only a relatively small fraction of those tested.

TABLE 2

% of tested bulls selected on basis of 20 progeny in preliminary artificial breeding test	Superiority of future progeny of selected bulls over progeny of all bulls purchased for artificial breeding (lbs. butterfat per lactation)
90	1.3
80	2.8
70	4.2
60	5.6
50	7.0
40	8.6
30	10.5
20	12.8
15	14.2
10	16.1
8	17.1
6	18.3
4	19.9

Now let us combine the findings on the effect of number of progeny on the accuracy of the sampling test (Table 1) with those on the effect of number of bulls tested (Table 2). The best prediction of the amount by which future progeny of bulls selected in a preliminary test will exceed the progeny of bulls unselected in such a test is 1.9 times the appropriate entry in Table 1 times the appropriate entry in Table 2.† To illustrate, suppose that 10 bulls are tested by 50 progeny each, and then the best 5 bulls are selected. The predicted superiority of their future daughters is $1.9 \times .67 \times 7.0 = 9$ lbs. Then, once it is decided how many artificially sired

† If the appropriate entry is not available in Table 1, the prediction is $1.64\sqrt{n/(n+34)}$ times the appropriate entry in Table 2.

daughters in D.H.I.A. herds can be assigned to the preliminary testing program, one can compute the optimum number of bulls to test. For example, if a total of 500 progeny can be tested and if 5 bulls are to be selected, the predicted superiority of future progeny of the selected bulls is as shown in Table 3. Thus, the best

TABLE 3

Number of bulls tested	Number of progeny per bull	Superiority of future progeny of 5 selected bulls over progeny of all bulls purchased for artificial breeding (lbs. butterfat per lactation)
6	83	3
7	71	5
8	62	7
10	50	9
12	41	10
14	35	11
20	25	12
25	20	13
50	10	13
75	6	12
100	5	11

testing program in this case involves the sampling of a few more than 20 bulls.

As one would expect, the success of a breeding program based on preliminary artificial breeding tests is greatly dependent on the size of the total testing program. Table 4 indicates just how dependent. In this table is shown the relationship between expected superiority of progeny of selected bulls and the total number of progeny in the preliminary test per bull finally selected. For example, if there are 40 daughters out of each of 10 bulls in the preliminary test and 4 bulls are selected, there are $(40 \times 10) \div 4 = 100$ tested daughters per bull finally selected. The superiority of future progeny of the selected sires would be predicted as 13 pounds. This table indicates that the success of an artificial breeding testing program depends greatly on its total size.

Close examination of the data presented in this paper reveals that if artificial breeding associations can arrange to test many bulls and select only the very best for heavy use in artificial breeding, production of dairy cattle can be increased rather markedly.

TABLE 4

Total number of progeny in preliminary test divided by number of bulls selected	Superiority of future progeny of selected bulls over progeny of all bulls purchased for artificial breeding (lbs. butterfat per lactation)
20	7
40	9
60	11
100	13
200	16
400	20

Possible increases of 15 to 20 pounds per year of butterfat (Table 4) over the increases that NYABC sires are presently demonstrating would indeed be of tremendous economic importance to New York State.

Atoms Aid Plant Research

Condensed from New Jersey Farm & Garden

Dr. Stephen J. Toth
Associate Professor, Soils Dept., N. J. Experiment Station

FARMERS will be able to save tons of fertilizer as the result of research projects underway all over the country with radioactive atoms. They will learn to apply it more intelligently, and how to time application to get better results. The same can be said for better use of minor elements.

We have been experimenting with radioelements in soil and plant research at Rutgers for five years, and our principal job is to uncover fundamental knowledge. At the same time, we usually find some things of immediate practical value.

It has been demonstrated at North Carolina State College, that phosphates do not move around in the ground, and are not disturbed much even by rain. As a result, farmers in that area are being advised to plant fertilizer with the seed.

Another important discovery is that plants, even when they get extra phosphate, may refuse to use it. If 100 pounds of nitrogen are placed in an acre of soil in which corn is growing, the corn will use all of it in one season. If the same amount of phosphate is applied, the corn will use only one-tenth of it. The rest of the fertilizer, however, will remain in the field for future crops to draw upon. Many of our farms may contain as much as eight times as much phosphate as the plants require.

Any substance that emits rays or particles of matter is radioactive. They are invisible yet can penetrate. Elements that possess this property are called "radioelements" or "radioisotopes." Some of these elements occur in nature and some can be produced in the laboratory.

By measuring the rate at which these elements emit rays (all of them have individual energy levels), we can estimate the content of the radioisotope in a sample. The measuring device consists of an electronic Geiger-Muller tube. As the particles of invisible matter enter, a scaling device registers the number that enter in units of time. Further, the emitted particles also have the property of affecting photographic film just as light rays do.

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Sea Isle City, New Jersey, January 1952

Plants containing radioelements, when partially dried and pressed against an X-ray plate, produce in time a "radioautograph." This locates the position of the radioisotope in the plant.

Since the explosion of the first atomic bomb over Japan in 1945, the Atomic Energy Commission has stressed the peaceful applications of atomic energy. And in soil and plant studies, radioactive atoms make it possible to arrive at findings that could not be obtained by the usual methods of testing.

Working with phosphorus fertilizers that were tagged with a radioelement (P32), USDA workers have observed that corn and soybean plants require less fertilizer phosphorus as these mature, whereas potatoes have a high requirement during their growing period. It would have been impossible, for example, to establish this fact by usual methods of study since one could not differentiate between phosphorus present in the plant which came from the soil and that added in the form of fertilizer.

The program of radioisotope research in the soils department of the N. J. Experiment Station has been confined so far to the following elements: sodium, calcium, cobalt, zinc, manganese, and chlorine. Here are the most important findings to date:

Sodium: This element tends to concentrate in the stems and leaf veins of plants and apparently has little if any specific function as a nutrient element. The rate of absorption of this element is very rapid since a four-foot tall tomato plant contained the radioisotope in its growing tip 15 minutes after its application to the surface of a culture.

Calcium: Under normal cultivation practices when soils are limed with limestone and a complete fertilizer is added and alfalfa seeded, the plant absorbs the bulk of its calcium from the limestone rather than from gypsum or phosphate of calcium contained in the fertilizer. The turning of the leaves of legumes toward light as well as the loss of leaves of legume hay by shattering has been explained by the absence of the calcium in certain parts of the leaf.

Cobalt: This element, which is of importance in animal nutrition, has apparently no specific function in the nutrition of plants. In some species it tends to concentrate in leaf veins and in others in areas between the veins.

Zinc: It has been observed that the effects of phosphates on immobilizing this element in soils is not a permanent condition, only temporary in nature. Zinc also tends to become precipitated and immobilized in older leaves of plants.

Manganese: This element be-

haves in a manner similar to zinc in the plant. Studies of spray applications have shown that the element enters the leaf and the bulk of it is moved upward in the plant.

Chlorine: This element has been found to be concentrated in the sugar storage cell of red table beet roots as well as in the leaf veins and stems of plants.

Start Pigs Gradually On Green Pastures

An Iowa State College extension swine specialist has some suggestions for getting young pigs started on lush, green pastures with less trouble from scouring.

Pastures are late this spring, and hog producers are getting anxious to move their sows and pigs out of the farrowing pens onto clean ground. However, they can make this shift too abruptly, in the opinion of E. L. Quaife, extension swine specialist at the college.

Sows and pigs turned out on lush legume pastures directly from drylots usually develop scours. They have them for a week to 10 days and as a result suffer some setback.

This type of scours can be prevented by accustoming the sows and pigs to green feed slowly. Quaife suggests cutting some and feeding it in the pens in drylot.

The swine specialist says it is a good practice to full-feed pigs on pasture until they reach 60 to 75 pounds in weight. Pigs up to this size can't eat enough grass or legumes to obtain enough protein to balance the grain.

After the pigs reach 60 to 75 pounds the protein in the ration can be reduced considerably if there is a lot of good pasture. This is especially true with pigs that will not reach market before late fall. Corn and pasture will often provide them with all the nutrients they need.

However, for early-farrowed pigs being pushed for the high-priced late summer markets, Quaife suggests full-feeding right up to market time. The higher price received will more than pay for the extra feed required.

Although it is getting rather late to sow rape, Quaife says it may still be the best temporary pasture crop if legumes are lacking. Rape will do exceptionally well if the season remains damp and cool.

—Hog Breeder

Control of Broomsedge in Pastures

Condensed from the Southern Planter

D. T. Painter
District Supervisor, Extension, TVA

BROOMSEDGE can be eradicated in old pastures by proper fertilization, grazing and mowing. No one of these practices will do a complete job by itself.

Fertilizer and lime not only stimulate growth of better pasture plants, but also the undesirable ones, including broomsedge; and unless such pastures are grazed reasonably close and clipped at least once a year *before* the sedge grass makes seed, control will only be partly successful.

Based on experimental studies, the average life of a broomsedge plant was found to be from 3 to 4 years. Since it reproduces itself only from seed, relatively close grazing and mowing at the proper time prevents seed formation in late summer or early fall, and reinfestation of the pasture. This practice also reduces its vigor and shortens its life cycle.

To combat broomsedge, the first essential is to build up the fertility of the soil by applying adequate amounts of phosphate, potash, nitrogen and lime where needed, so that the clovers and the more desirable pasture grasses can compete with and crowd out the broomsedge, aided of course by proper grazing and clipping.

To eliminate broomsedge in many of the old permanent pastures containing less than one-fourth legumes, it will be necessary to top-dress annually with a complete fertilizer such as an 8-8-8 at the rate of 600 to 800 pounds per acre; or mix around 200 pounds of ammonium nitrate with 500 pounds of 0-14-14 and apply it at about the same rate immediately after mixing during the late fall, winter or early spring.

The addition of nitrogen makes the broomsedge more palatable and the livestock will graze it along with other better pasture plants and further reduce its life cycle. Nitrogen stimulates the growth of pasture grasses, while phosphate and potash greatly increase the vigor of the legumes and enable both to compete better with and replace broomsedge and other undesirable plants. When practically all of the broomsedge is eradicated in such pastures, around 800 pounds of 0-14-7 or 0-14-14 per acre every 3 or 4 years should maintain a good sod of legumes and grass.

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Richmond, Virginia, February, 1952

Based on recent experiments, if you wish to keep or increase the broomsedge in your pasture, burn it each year. These experiments show that after burning over an untreated pasture for four years the amount of broomsedge increased 25 per cent; while on the adjoining area of the same field that was clipped before it matured seed the stand of broomsedge decreased about 12 per cent.

Kill Flies by New Strip-method

A new spot treatment method of insecticide application may solve the milk contamination problem and reduce labor and cost of fly control. Cornell University, New York, is testing the method which involves dipping ¾-inch strips of galvanized screen wire in a concentrated fly killer then fastening them to the barn ceiling. Strips are dipped and dried outside the barn, so there is little chance that the chemicals will drift into mangers or onto cows.

Screen wire was chosen as flies seem to prefer a screen surface to one of wood, glass or metal. Scientists found that flies, with legs paralyzed from effects of the insecticide, could cling to the screen surface until they received a deadly dose of poison.

Eighty percent of the flies were killed 24 hours after dieldrin, chlordane, toxaphene and lindane treated strips were put in heavily infested barns. The strips, spaced 1 foot apart, were tested in 27 dairy barns. The strip-method required only half as much insecticide for the season as did the over-all spray.

Strips treated with a 15 percent dieldrin concentrate gave good control for 16 weeks. Those dipped in a 15 percent solution of chlordane, toxaphene or lindane gave effective control for 4½ to 9 weeks. There was no contamination of milk from cows in 8 barns containing lindane treated screen wire.

The New York tests showed there was no difference in the lindane resistance of flies treated with the insecticide 1 and 2 years. The influence of barn sanitation was proven by the fact that, for all insecticides, the period of control could be increased 2 to 3 times by proper cleanup and waste disposal.

—Cappers Farmer

Which Brooding System?

Condensed from American Poultry Journal

James Dalton

A QUESTION often asked by broiler growers who are building or remodeling a broiler house is—What type of brooding system should I use? And if they ask this question of several different growers, the chances are they will get as many different answers. The reasons for this difference of opinions are many.

Size of operation is one deciding factor, because a brooding system that would be satisfactory for a person growing 1000 broilers would not necessarily be satisfactory for a grower growing 10,000 birds.

Management is also a deciding factor. A broiler grower who is used to brooding chicks by one method might find it difficult and make mistakes if he changed over to another method, until he became accustomed to his new system.

Installation costs will vary with the size of the plant and the type of system used. Individual stoves will cost a large grower as much per chick installation cost as it would a small grower. However, central heating installation costs decrease as the size of the flock increases.

So it can be seen that it is difficult to make a general recommendation that would be suitable for all growers. The grower's best bet is to analyze the advantages and disadvantages of different systems, the cost of installation of various systems in his community, and to compare the operating costs.

Since the type of heat does not seem to be a major factor as far as feed efficiency, weight gains or mortality are concerned, nearly any type of brooding equipment will be satisfactory if installed in a suitable house and operated correctly.

In general there are two types of brooding systems: the "warm rooms," where the entire pen is heated, and the "cool room," where only that area under the hover is heated. Coal stoves are a good example of warm room brooding, and electric brooders an example of cool room. Both systems have advantages. With the cool room system, there is usually more rapid feathering and lower fuel costs, while the warm room system can claim a drier litter, more comfort for the chicks in cold weather and the availability of more heat if chicks get sick.

Some of the advantages of dif-

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ferent types of individual stoves are as follows: coal; keeps litter dry, provides enough heat when chicks are sick and gives more heat in winter. The disadvantages are: more labor is required, difficult to regulate, and there may be a fire hazard. Advantages of oil stoves are: keep litter dry and low installation costs. Disadvantages are: high fuel costs, requires frequent attention of burners and fire hazard. Gas stoves require less labor, give constant temperature, are less of a fire hazard and can be lifted easily to check on chicks. The disadvantages are: moisture condenses in winter, not enough heat when chicks are sick and maintenance of burners. Electric stoves have about the same advantages as gas stoves, but the disadvantages include the possibility of a power failure, room temperature may be too low in winter, wet litter in winter and insufficient heat when chicks get sick.

Central heating systems with hot water or hot air are popular where chicks are grown in large numbers in commercial broiler plants. They are more economical in labor and fuel than individual brooders and offer less fire hazard. Either system can be used with an oil-fired or coal-fired furnace. The choice between several types of installations is usually a matter of personal preference. Installation costs per chick for central heating systems are much higher in small houses than in large ones. For this reason, individual stoves are usually recommended for smaller broiler growers.

The two hot water systems most commonly used are first, a series of hot water pipes 9 to 12 inches above the floor and a third to half way from the rear to the front of the house and second, fin pipes installed on the rear wall about 9 to 12 inches above the floor. Both give a modified cool room system of brooding.

There are a number of central hot air brooding systems that are gaining in popularity. One advantage of hot air brooding is that humidity can be added if necessary.

The above brooding systems and equipment are only a few of the more popular in use. Besides these, there are the recent infrared heat lamps and under floor brooding. Both systems have their merits under certain conditions.

The final decision in answer to the question, "What brooding system should I use?" depends on the judgment, after careful study, of the grower himself.

More important in growing good broilers are: management, amount of floor space, and feeder space per chick, ventilation, quality of chick, quality and type of feed, type of house and a deep interest in growing quality birds.

Brangus Cattle

Condensed from The Cattleman

C. Faye Bennett

THE American Brangus Breeders Association presented its first class of registered cattle in the show ring at the San Antonio Livestock Exposition in February, 1950. The first National Brangus sale was held in February, 1952, in conjunction with the Brangus show at the San Antonio exposition. The large, black, polled animals show, not only the outstanding size and survival qualities of their 3/8 Brahman blood and the decided beef qualities of their 5/8 Aberdeen-Angus blood, but the accent is on much that is decidedly their own.

Brangus cattle are uniformly black. Their hair is fine and short and sleek. Their dressing percentage is good and they are heavy. The sweepstakes champion heifer, owned by Clear Creek Ranches, weighed 1,800 pounds at three and one-half years. Her heifer calf, which was sired by a Brangus bull, shows the same straight, long and broad toplines. Though the breed is still in its infancy, Brangus bred to Brangus have reproduced their kind.

By combining the best stock of two breeds the net result, as it appears in the top winning prize cattle, is: a large, well fleshed, long bodied animal with rounded hind quarters and a wide, deep body.

On the Brahman side of their history the emphasis is on an amazing record of survival for more than 4,000 years under the most adverse conditions of climate and disease, with very little help from man. There is the outstanding record of their improvability in America where breeding conditions have been favorable. The long-legged, rafter hipped animals from India have put on broad, beef type backs and loins under improved systems of breeding. Their performance in the show ring is admirable and their top winning record is known to cattlemen throughout the nation. Brahmans have been crossed, back-crossed and double-crossed with all breeds of cattle. The economic value of such crosses has been repeatedly tested and tried in government experiment stations as well as in private herds.

On the Aberdeen-Angus side of the Brangus there is a continuous record of honor in national as well as international show rings. From its beginning until the present day,

Reprinted by permission from The Cattleman
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the Aberdeen-Angus has been noted for its rich, finely marbled beef qualities, well developed back and hind quarters, a low-set body, and good fleshing qualities. There is documentary evidence of polled, black cattle in Scotland as early as 1523. Aberdeen-Angus cattle were imported to America by George Grant of Victoria, Kansas, and made their first appearance in the show ring at the International Livestock Exposition in 1900. They have continued to rate repeated honors and a growing appreciation among breeders generally.

Raymond Pope and Frank Buttram, co-partners and founders of the Brangus breed of Clear Creek Ranches, and the members of the American Brangus Breeders Association believe they have added a great deal of profit to their herds by combining the proven points of both breeds.

Brangus cattle seem to be unusually resistant to pink eye, cancer eye and other eye disorders. They are polled. They have sweat glands, which is an endowment from the Brahmans, the only breed of cattle in the world with the ability to perspire. Because of this natural cooling system, heat does not bother them. Flies, mosquitoes, screw worms and other insect pests present the minimum degree of annoyance to the Brangus. Brangus cattle have proved their hardiness, disease resistance, heat tolerance and general survival in northern states as well as in the South. Brangus breeders in the process of developing their herds in Canada, Wyoming, Nebraska, Montana, Colorado and Oklahoma, agree that their cattle in the Northwest storm area of the country withstood the adverse weather conditions as well as any cattle there.

As a good grazer and a rustler the Brangus literally "goes to grass." "When you can sell your weanlings right off the grass with very little supplemental feeding, your bulls beginning at $400 and ranging up to $5,000 per animal, your heifers from $300 to $800 each, that is good business," says Raymond Pope, president of the American Brangus Breeders Association.

In the firm belief that they had found a short cut from grass to beef, the American Brangus Breeders Association was organized with 54 members in 1949 at Vinita, Oklahoma. Today the rapidly expanding membership rolls are closely touching the 300 mark with enthusiastic cattlemen at work on building the breed in 16 states, in Canada, Costa Rica, Mexico, Australia, Paraguay and Venezuela. They have enrolled and registered 10,500 cattle in their herd book of which approximately 2,000 are registered purebred Brangus.

The Brangus Association is a

non-profit organization designed to further improve the Brangus breed by scientific and technical education and to keep the proper records showing the pedigree of all registered Brangus cattle, as well as the complete pedigree or breeding history of the intermediate breeding stock used to produce Brangus cattle.

The intermediate blood percentages that it takes to make a Brahman are enrolled on the Brangus association herd books as foundation stock, so that when a Brangus is produced a complete and accurate record of his ancestry is available.

The name, "Brangus," is a trade name and can be used only on cattle registered with the association. The true Brangus is an animal that is hornless, black in color, that meets the conformation requirements of the appraisal committee and carries 3/8 Brahman and 5/8 Aberdeen-Angus blood. The foundation stock required to produce a Brangus includes: purebred Brahmans; purebred Angus; quarter-bloods (1/4 Brahman and 3/4 Angus); half-bloods (1/2 Brahman, 1/2 Angus); and, three-quarter-bloods (3/4 Brahman and 1/4 Angus). To produce a Brangus, a quarter-blood individual may be mated with a half-blood, or, a three-quarter-blood individual may be crossed with an Angus to produce the same results. The characteristic increase in size and vigor is noticeable on all the crosses up to and including the progeny of Brangus bred to Brangus.

The by-laws of the association provide every precautionary measure for the protection and improvement of the breed and the inspection of any interested party is invited. The small breeder, as well as the large, may profit by membership in the association and add his part to the "fixing" of a great breed of cattle that is already made, "to the extent that it has reproduced its kind."

With his watchful eye on the legs of Brangus calves, President Pope, the founder of the breed, was quick to reply to the statement that the legs of Brangus cattle seem to be getting shorter, "Yes, but we do not intend to let them get too short. After all they have to have legs to get from the center of the pasture to the water hole."

Though the history of the Brangus breed as developed by co-partners, Raymond Pope and Frank Buttram, is briefed into a short record of only ten years, thousands of vigorous black cattle (approximately 2,000, on the grassy hills of Clear Creek Ranches, at Welch, Okla., and in the show window of their newly acquired cowland de luxe at Grenada, Miss.), bear testimony to the fact that the breed is prolific as well as profitable. Here, in the center of prac-

tically every known grass that is good for a cow, the prize winning Brangus cattle and the intermediate stock from which they are made, have but to graze to their fill and lie down in green pastures.

The Welch ranch consists of 14,000 acres in the rich bluestem grass region of Craig County, Oklahoma. The site was selected not only for the good grass and water on the endless prairies, it was also chosen as the cradle for the new breed of cattle that had persisted in Raymond Pope's mind since he studied genetics in the animal husbandry division at Oklahoma A. & M. College at Stillwater.

When he graduated from Stillwater in 1938, Raymond Pope went to work for Buttram and Brown on their cattle ranch near Jeanerette, La. His dream of making a new breed of cattle to produce, "the most beef per acre at the least possible cost," was further stimulated by the promising size and vigor of the cattle produced by the experimental cross-breeding system of the U. S. D. A. at Jeanerette. Young Raymond was so enthused that he said he thought he would buy a bull and two cows and go into business for himself. Then, when Buttram and Brown dissolved partnership in the cattle business, Frank Buttram said, "Well, if you are so sure that it will work, you pick the cows and the land and we will be co-partners."

The Welch Ranch was selected by Pope as the cradle of the Brangus breed because Craig County, Okla., was neither too far north nor too far south. It offered a wide variety of weather for the cattle that were to be sturdy enough to pass every endurance test of climate.

The business began with 900 Brahman cows which were bred to Aberdeen-Angus bulls. Then, because of the scarcity of good Brahman cows, it was necessary to sell the Brahmans and replace them with purebred Aberdeen-Angus cows. The search for animals with the desired conformation and breeding led into Canada and several states. The best Brahman bulls from the J. D. Hudgins herd at Hungerford, Texas, were used on the Angus cows to produce the foundation stock, and, "the results from the first," says Pope, "were profitable and satisfying." The increased size and vigor of the first cross does not diminish with the third and fourth generations, but continues to characterize the progeny through all successive matings.

Today the big Brahman bull stands head and shoulders above the registered Angus cows in the pastures at Welch, where the intermediate breeding stock for the large herds of Brangus cattle is in the making. The strong and vigorous half-blood progeny are almost

as large as their mothers at weaning.

In one pasture there is a herd of coming two-year-old half-blood heifers that will undoubtedly make history for the Brangus breed. Their uniformity, their outstanding size and conformation with their sleek, alert appearance, command the open admiration of all comers. These half-blood heifers have been mated to a quarter-blood bull and will produce Brangus calves before they are two years old. Their average weight today is 1,150 pounds.

The carefully culled and graded cattle at Welch weather the winters in the open. With the exception of the winter months they flourish and grow fat on grass alone. "It is from these sizeable herds of intermediate breeding stock," says Pope, "that we expect to produce all purebred Brangus calves by the year 1954."

By 1950, it became necessary to add more land to the rapidly expanding cattle business at Clear Creek Ranch. There was, from the beginning, a wide demand for breeding stock, and, says Raymond Pope, "Since we are not ranching for a hobby but are in this thing to make money," the search for suitable land with all the necessary requirements began.

At length the famous Glenwild plantation at Grenada, Miss., was selected as the southern branch of Clear Creek Ranches. With its healthy grasslands on the rolling hills and the elaborate improvements as developed by the fabulous millions of John Borden, a previous owner, the southern branch of Clear Creek Ranches at Grenada makes a magnificent show window for the prize winning Brangus cattle.

It hardly seems possible that so much could be accomplished in the cattle business in the ten years time that it has taken Raymond Pope to produce this rapidly growing breed of cattle. The fact that the fixing and improvement of the breed is not a closed book is perhaps one of the most favorable signs in its future. The wide open door of competition in the American Brangus Breeders Association will give the history making individuals of the breed a chance rise to the top.

Do You Know?

Earthworms, of which there are said to be 50,000 in each acre of land, bore holes in the soil thus aerating it as does the farmer's plow.

"Your Health"
—The Pennsylvania Medical Society

Citrus Pulp For Dairy Cows

Condensed from The American Agriculturist

Harold R. Brundage

DAIRYMEN will accept a new feed only if it meets two conditions. It must be economical, as well as being a good feed for their cows. Citrus pulp has been made in Florida since 1932, but only in the past four years has it been made in any great quantity. The tremendous increase from 68,724 tons in 1944–45 to over 150,000 tons in 1950–51 made possible the shipping of greater quantities of citrus pulp out-of-state so that it is now known by dairymen in almost every state east of the Mississippi.

What is citrus pulp?

In the form of raw pulp, composed of the skin, interior matter (rag), and seeds, it was considered to be a waste product of the citrus juice industry. Operators dumped the waste in fields and streams. The State Health Department disapproved this practice, forcing operators of juice plants to bury the raw pulp, or disc it into the soil. Both of these methods were expensive.

Crude experiments at drying were carried out in the '20s by the Florida Experiment Station. Later a large quantity of grapefruit peel was dried for export to England. Failure of the project led to the feeding of the pulp to a dairy herd as an addition to the regular ration. There was such a marked stimulation of milk production that the owner was loud in appreciation, for a commercial manufacturing plant was established in the early '30s.

From the first crude drying methods in trays over steam pipes, were developed the systems of dehydration used today. First the pulp is pulverized in a hammermill and mixed thoroughly with lime in order to loosen the bound water of the peel. Then it is run through a press to squeeze out most of the moisture, thence into a huge revolving drum where either flame heat, or steam heat dehydrates it to an 8 or 10% moisture content.

In dried form citrus pulp is a bulky, golden-brown carbohydrate concentrate. It is not a roughage since the fiber content of 14% is lower than that of most hays. It contains 6% protein, 3%–5% fat, and is a good source of calcium, although low in phosphorus. It contains 76% T.D.N.

How much pulp can a dairyman feed in safety?

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Dr. R. B. Becker, dairyman at the Experiment Station in Gainesville, Florida, and an authority on the feeding values of pulp, indicates that he believes .8 of a pound of dried citrus pulp per hundred pounds of live weight is about the proper amount to feed dairy cows. He declares that most dairymen tend to overfeed, and would rather be conservative for that reason.

A dairyman should not expect to dump a quantity of citrus pulp into the manger and expect a cow to smack her lips and wade in with evident relish. Cattle, like humans, have an educated sense of taste. Any change in feed will require a period of adjustment. The best way to do this with citrus pulp is to mix a small quantity of it with some of the grain supplement, gradually increasing the amount each day until the cattle are receiving the total amount. The grain supplement may then be fed as usual, and the pulp given as a bonus.

Various other trials revealed the fact that citrus pulp is a good feed *if properly used.* It should be fed in proper amounts together with a good quality green hay and a protein supplement of some kind. It was found that citrus pulp is low in Vitamin A and in phosphorus but they can be made up by feeding good green leafy roughages, and mineral supplements.

Mr. Waldo Sexton, owner of 150 milking cows, has fed both beet pulp and citrus pulp. His barn man, Charles Miller, who has charge of the active care of the animals, said that they tried both thoroughly, and found them to be about the same in results. However, citrus pulp won out on the basis of price.

The reason that citrus pulp can be sold at a low cost and still make money for the plant operator is the fact that ordinarily the pulp plant is adjacent to, or a part of the operation of a concentrate or a juice plant. If it is independent of either, or both, pulp is secured on a basis of payment for the raw material according to the price obtained for the dried product. A few pulp plants are able to obtain the raw material for nothing, the concentrator and juice plant being only too glad to be rid of the problem of disposal.

Without a doubt, the one reason why dairymen have accepted citrus pulp so readily is the one which strikes home most forcibly—cost. Whether in Florida or in New York makes little difference—citrus pulp is a low priced feed on the basis of T.D.N. per 100 pounds.

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The ultimate aim of government is not to rule, nor to restrain by fear, nor to exact obedience, but contrariwise, to free every man from fear, that he may live in all possible security; in other words, to strengthen his natural right to exist and to work without injury to himself or others. No, the object of government is not to change men from rational beings into beasts or puppets, but to enable them to develop their reason unshackled; neither showing hatred, anger nor deceit, nor watched with the eyes of jealousy and injustice. In fact, the true aim of government is liberty.

Spinoza (1670)

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